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Twenty-sixth Annual Meeting, Ottawa, June 17-19, 1937

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TWENTY-SIXTH ANNUAL MEETING  
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**OTTAWA**

**JUNE 17-19**

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## Recent Advances in the Study of Influenza\*

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THERE is no satisfactory definition of influenza. During epidemic periods it is characterized by a probable incubation period of about 48 hours and an abrupt onset with fever, malaise and depression. Pains in the head, back and limbs are common. The fever lasts only for 3 or 4 days but recovery is usually slow with a considerable degree of prostration during convalescence. Coryza, pharyngitis, tracheitis and bronchitis may accompany the fever. Pneumonia may occur as a complication. There is generally a leucopenia. Finally, there is almost always evidence of extreme contagiousness. During an epidemic, cases are easily recognized but during inter-epidemic periods cases with the majority of these symptoms are comparatively common. Sometimes cases of common cold with an associated fever mimic epidemic influenza very successfully. It is probable, however, that such infections are not truly influenzal; but the differential diagnosis is not readily made and there is here a very considerable field of clinical research awaiting study.

### AETIOLOGY

Two agents have been incriminated as the cause of influenza: a bacterium, *H. influenzae*, and more recently a virus.

#### *H. influenzae*

In a large proportion of the cases in the influenza epidemic of the year 1892 Pfeiffer discovered the bacillus which frequently bears his name but which is now officially, and in view of recent events somewhat unfortunately,

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termed *Haemophilus influenzae* (Pfeiffer, 1, 2; Pfeiffer and Beck, 3). For many of the succeeding years this micro-organism was looked upon as the cause of epidemic influenza. In the epidemic of 1918 the same micro-organism was isolated from cases of the disease (Pritchett and Stillman, 4; McClelland, 5; Duval and Harris, 6; Schorer, 7; Medalia, 8; Dick and Murray, 9; McIntosh, 10) and from its distribution there is no doubt that this micro-organism was invading the tissues in a very considerable proportion of the fatal cases. There is, however, evidence that in certain stages of the epidemic (particularly the summer wave of 1918) the micro-organism was only occasionally found (Mandelbaum, 11; Selter, 12; Messerschmidt et al, 13; Leichtentritt, 14; Kristensen, 15). For this reason doubts began to be expressed as to the importance of this micro-organism as the cause of epidemic influenza. A comprehensive summary of the literature on this point may be found in the monograph of Kristensen (15).

Since 1918, doubt as to the importance of *H. influenzae* has increased rather than diminished. Although this micro-organism can cause infections in man such as influenzal meningitis, its experimental instillation into the respiratory tract of animals has usually produced either no effect or symptoms that were not strongly suggestive of influenza as it occurs in human beings (McIntosh, 10). Similar instillation of cultures into human beings had not been extensively attempted until recently when Smorodinsteff et al (16) showed that a virulent strain of *H. influenzae* in inhalation experiments in human volunteers caused slight symptoms of infection of the respiratory tract but that several of the more typical symptoms of influenza were not produced, the illness was not contagious and a leucocytosis rather than a leucopenia resulted.

The importance of *H. influenzae* has rested almost solely on inference; it was said to be present in cases with the disease and absent or at least unusual in normal persons. That it is not invariably present in the disease has already been pointed out. The statement that it is only seldom present in normal persons will also have to undergo modification in view of the recent work of Fleming and MacLean (17) who showed that by employing a selective medium it is possible to demonstrate the presence of this micro-organism in from 90 to 100 per cent. of normal throats. Although the work of Pittman (18) has indicated it to be possible that a large proportion of such saprophytic strains were probably rough non-capsulated avirulent variants, the fact that *H. influenzae* was found so frequently in normal persons destroys one, at least, of the arguments brought forward in support of the hypothesis that it is the cause of epidemic influenza.

### *Virus*

Although prior to 1933 attempts had been made by various workers to show that a virus is the infective agent of influenza, these had been largely inconclusive for a variety of reasons. In that year, however, Smith, Andrewes and Laidlaw (19) showed that filtered nasopharyngeal washings from cases of epidemic influenza instilled into the nasal tract of ferrets would produce a

febrile illness which could be transmitted to healthy ferrets in series by means of filtered suspensions of the tissue of the turbinate bones. A typical syndrome is produced which can be produced by no other material such as washings from normal throats or from cases of common colds. Indeed, washings from many cases of apparently typical epidemic influenza may fail to cause illness in the ferret.

It thus appears that a filterable virus is an infective agent of influenza. This virus is infective only if instilled into the respiratory tract either by way of the nostrils or injection into the lung. In the first experiments the washings were introduced into the nostrils without anaesthesia but so active is the sneeze reflex that very little material entered and a proportion of the negative results obtained may have been due to this. Shope (20) showed that preliminary anaesthesia would abolish this reflex so that it is possible to instill one or two cubic centimetres of fluid with corresponding increase in the severity of the infection. Subcutaneous, intramuscular, intraperitoneal, intradermal, intratesticular and intracerebral inoculations of the virus are without effect. None of the ordinary laboratory animals is susceptible; and only ferrets and swine are susceptible to the virus inoculated direct from man (Smith, Andrewes and Laidlaw, 19; Francis, 21; Elkeles, 22).

Following inoculation, there is an incubation period of from 24 to 48 hours during which no change in the animal can be detected. The animal's temperature then rises to 104° F. or more but falls to normal (101-103° F.) during the next 24 hours. It then rises again and continues high for 2 to 4 days, finally becoming normal in from about 7 to 10 days. The temperature response is very variable in spacing and in degree but its diphasic character appears to be usual. During the period of the second rise in temperature, nasal symptoms such as a watery discharge which later becomes mucopurulent are common. At the same time the animal sneezes and yawns frequently, and there is excessive lachrymation. The animal is sluggish in movement and usually refuses food.

No virus inoculated direct from man has yet caused a sufficiently severe infection to kill the animal or even to cause pneumonia. But if passage-virus be employed and the instillation be carried out under ether, pneumonia occurs much more frequently and the resultant illness is more severe.

The disease in ferrets is highly contagious so that it can be transmitted to healthy ferrets merely by placing them in the same cage or even in the same room as an infected one. For this reason the experimental animals must be rigidly isolated from one another by a technique modelled on that employed by Laidlaw and Dunkin in their studies of canine distemper. The technique is extremely elaborate. Much space, time, and loyal co-operation by the staff of the animal room are required. Experimental studies were, however, facilitated by the independent discovery by Andrewes, Laidlaw and Smith (23) and by Francis (21) that the virus after passage through ferrets could infect mice if it were instilled into the nostrils under ether anaesthesia. Virus has never been transmitted direct to man from mice despite many attempts. Sometimes only one ferret-passage is required, more often several.

The only pathological change seen in mice is a variable amount of red hepatisation of the lungs. There are no nasal symptoms. Probably for this reason the mouse infection is not contagious and, provided that ordinary cleanliness is practised, is not transmissible by contact.

The disease in mice is, on the whole, more severe than in ferrets. The animals appear to be extremely sick and crouch together with the fur of the head and neck standing on end. The eyes are half closed and the animal is quite indifferent to its surroundings. Towards the end the breathing is slow and laboured. A large proportion of the mice die between the fourth and the seventh days. On post-mortem examination the most typical change is a variable amount of red hepatisation of the lungs, the substance of which is usually sterile when tested bacteriologically.

Washings from cases of human influenza instilled into the nostrils of swine will cause a mild afebrile illness (Elkeles, 22). Ferret or mouse virus will act in the same way (Shope and Francis, 24). But when virus is combined with a culture of *H. influenzae suis* (see below), a much more severe febrile illness closely resembling swine influenza is produced.

That the disease produced in ferrets and mice is due to the virus of human influenza is, of course, not yet completely proved. There is, however, no doubt that a typical illness can be produced by the intranasal instillation of filtrates from influenza patients; that the infection of animals can be transmitted in series by bacteriologically sterile filtrates; and that the activity of such filtrates can be neutralized by the serum of convalescents from the disease. There is also evidence that human beings can become accidentally infected from animals in the acute stage of the animals' infection and that virus can be isolated from such accidental infections (Smith, Andrewes and Laidlaw, 19; Smith and Stuart-Harris, 25). Smorodinsteff et al (26) actually went further and showed that suspensions of virus instilled into the respiratory tract of five individuals brought about a typical attack of influenza.

Since the original observations in 1933, virus with similar properties and immunologically related to if not identical with the British strain has been isolated in outbreaks in various parts of the world: Puerto Rico and Philadelphia (Francis, 21), Alaska (Francis, 21; Pettit, Mudd and Pepper, 27), New Haven, Conn. (Brightman, 28), Australia (Burnet, 29), Holland (Elkeles, 22), and Russia (Smorodinsteff et al, 26).

#### *The Presence of Virus in the Disease*

During an epidemic period it would appear that it is relatively easy to isolate influenza virus provided, of course, that nasopharyngeal washings used are reasonably fresh and that the animals receiving instillations are fully susceptible. During sporadic outbreaks of disease closely resembling epidemic influenza, however, the presence of a virus frequently cannot be detected (Andrewes, Laidlaw and Smith, 30). The same applies to related illnesses such as febrile colds and la grippe. It may be that a virus is not responsible for such attacks, that a virus is present but that a susceptible animal has not yet been found, or that the influenza virus is responsible but too avirulent

to cause infection in other animals. Needless to say, washings from normal throats or from convalescents are invariably without effect.

It was at first thought that all strains of human virus were serologically the same but Magill and Francis (31) have recently shown that differences may be detected between different strains.

#### *Cultivation of the Virus in Tissue Culture and in the Developing Egg*

The virus cannot be propagated in the ordinary cell-free media of the laboratory. In common with several other viruses it can, however, be cultivated in a medium consisting of minced chick-embryo and Tyrode's solution (Smith, 32; Magill and Francis, 33). Transfers are made at intervals of 2 or 3 days, and Francis and Magill (34) have now succeeded in maintaining one strain through more than 160 subcultures. There is no evidence that it has lost virulence in the process.

The virus also causes lesions on the chorio-allantoic membrane of the hen or duck egg (Smith, 32; Burnet, 35) and can be propagated in this way.

#### *The Relationship of Human Influenza to Naturally Occurring Infections in Animals*

In October and November, 1918, there appeared amongst the swine of Iowa what was certainly a new disease. It was characterized by a febrile prostrating illness which was extremely contagious but with a comparatively low death rate of from 1 to 4 per cent. This disease has reappeared each autumn in the Middle West and is now known as swine influenza. Shope (36) found that characteristic changes occurred mainly in the form of pneumonia, and that emulsions of such pneumonic lungs instilled into the nares of healthy animals almost invariably produced the disease. Bacteriological examination of the lesions showed that *H. influenzae suis* was invariably present, usually in pure culture. This micro-organism closely resembles the *H. influenzae* isolated from human beings but is different in that it ferments no carbohydrates and produces no indol. When cultures of this micro-organism were instilled into the nostrils of pigs no infection resulted (Lewis and Shope, 37). If filtrates of the lungs of animals with the disease were instilled, a very mild afebrile illness only distantly resembling true swine influenza was produced. When, however, filtrate and culture were combined, the animals developed true swine influenza (Shope, 38). The picture was therefore complete. To produce swine influenza two aetiological agents were necessary: a bacterium, *H. influenzae suis*, and a filterable virus. This virus alone is able to cause in ferrets and mice an infection indistinguishable from that produced by human influenza virus (Smith, Andrewes and Laidlaw, 19; Shope, 20). Lastly, human influenza virus combined with *H. influenzae suis* will cause in swine a disease resembling though not quite identical with that produced by the same organism and swine virus (Shope and Francis, 24). It is thus evident that the virus of swine influenza is closely related to that of human influenza. The importance of this relationship will be discussed later.

# THE PRESENCE OF ANTIBODIES IN THE SERUM OF NORMAL AND CONVALESCENT PERSONS

## *Neutralizing Antibodies*

It can be shown that persons recovering from epidemic influenza and animals recovering from the illness produced by human or swine influenza virus have neutralizing antibodies for the homologous virus in the serum (Smith, Andrewes and Laidlaw, 19; Shope, 39; Francis and Shope, 40). There is also evidence that the antibodies produced in response to infection with the human virus are distinct from antibodies produced after infection with the swine virus. On this basis it would appear that the human virus is serologically different from the swine virus (Smith, Andrewes and Laidlaw, 41; Francis and Shope, 42). On the other hand, if animals be hyperimmunized with the swine or the human virus their serum may acquire partial neutralizing power for the heterologous virus (with complete neutralizing power for the homologous virus), indicating that both viruses possess a common antigen (Francis and Shope, 40).

Specific neutralizing antibodies are found in the serum of a large proportion of normal human beings. A large number of investigations has been carried out in both England and the United States (Andrewes, Laidlaw and Smith, 30; Shope, 42; Francis and Magill, 43; Fairbrother and Hoyle, 44). Results obtained by these workers are given in table I. It will be there seen that between 40 and 60 per cent. of adults possess antibodies for human virus but a much

TABLE I

PERCENTAGE OF PERSONS OF VARIOUS AGES POSSESSING VIRUS-NEUTRALIZING ANTIBODIES FOR HUMAN AND SWINE VIRUS

Persons	Percentage of persons with neutralizing antibodies for	
	Human virus	Swine virus
Born after 1925.....	33, 49, 27 per cent.	0, 11, 13 per cent.
Born between 1916 and 1925.....	57, 58, 47 "	66, 63, 55 "
Born before 1916.....	62, 48, 46 "	100, 92, 63 "

Compiled from results obtained in England by Andrewes, Laidlaw and Smith (30), Fairbrother and Hoyle (44), and in America by Francis and Magill (43) and Shope (42).

higher proportion, 60 to 100 per cent., for swine virus. In the younger age-groups, and particularly amongst children in the first decade, antibodies for swine virus are unusual, only 0 to 13 per cent. possessing them, whereas a much higher proportion (27 to 50 per cent.) have antibodies for the human virus. These figures have led Laidlaw to make the interesting speculation in his Linacre lecture (45) that the 1918 pandemic of influenza was transmitted to swine in the autumn of that year and survives now as swine influenza, and that in human beings it died out, no virus of that type having to date been isolated from man. It was suggested further that the section of the population which went through the 1918 epidemic, and now comprising the age-group of 20 and over, acquired neutralizing antibodies for this virus in the process, whereas only a relatively small proportion of those who were born since 1918, and have



therefore had no contact with this virus, have neutralizing antibodies. Human virus, on the other hand, being with us apparently year after year, seems to confer about the same amount of immunity on all age-groups.

#### *Complement-fixing Antibodies*

Complement-fixing antibodies may be demonstrated in the serum of immunized animals, a proportion of normal individuals, and convalescent persons. Up to a point there is correlation between the titre of virus-neutralizing antibodies and the titre of complement-fixing antibodies, but as a test of immunity it is probable that complement fixation is not so reliable as the neutralization method. A further discrepancy is that complement fixation fails completely to differentiate between swine and human influenza viruses owing probably to their possession of a common antigen (Smith, 46; Fairbrother and Hoyle, 44).

#### ACTIVE IMMUNITY

Animals which have recovered from influenza are completely immune as soon as their temperature has reached normal and their symptoms have disappeared. This immunity is gradually lost so that in a few months a mild but definite illness follows instillation of virus. Thus there would appear to be little hope of obtaining an immunity to influenza for the rest of one's life, such as obtains in the case of several other virus diseases.

As already pointed out, influenza virus is infective only if it be instilled into the respiratory tract. If it is injected subcutaneously or intraperitoneally no infection occurs, but antibodies develop in the serum and the animals are subsequently found to be protected against pneumonia if not against infection. For this reason, attempts have been made to immunize groups of human beings by virus suspensions. Thus Francis and Magill (34) employed three subcutaneous or intradermal doses of the supernatant fluid of a tissue culture for immunization and showed that no symptoms and above all no infection resulted but that virus-neutralizing antibodies appeared in the serum and persisted for at least 5 or 6 months. No information is, of course, as yet available as to whether these individuals were protected against infection, nor do we yet know how long the antibodies persist.

Obviously the use of a living virus is open to many objections. Search has therefore been made for an immunizing vaccine in which the virus has been inactivated. Of the various types so far employed it would appear that one comprising formolized virus is most likely to be of value. Smith, Andrewes and Laidlaw (41) showed that such a vaccine would confer sufficient immunity on ferrets to protect them against lung lesions (employing a passage strain of virus which regularly produced pneumonia in controls). Andrewes and Smith (47) have recently shown that such a vaccine can confer complete immunity on mice. There is thus a possibility that a safe and practicable method of protective inoculation for human beings may be developed eventually. There is, however, reason to believe that any immunity produced by these methods will be relatively shortlived and will probably require periodical reinforcement.

## PASSIVE IMMUNITY

It is possible to obtain serum with virus-neutralizing antibodies by the injection of virus into horses and goats (Laidlaw, Smith, Andrewes and Dunkin, 48; Smith, 32). Such serum mixed with virus before instillation will completely prevent infection. If it be administered by injection after the virus has been instilled, the infection is modified and in many instances the life of the animals (mice) is saved. The earlier the serum is administered the more marked is the effect but nevertheless some effect can be noted even when the serum is administered as late as 72 hours after the virus.

A similar curative effect may be observed with serum from human convalescents; and several observers have reported good effects following the injection of human convalescent serum in influenzal pneumonia in human beings (McGuire and Redden, 49; McIntosh, 10; Kinsey, 50; and Hare, 51).

## SUMMARY

For reasons which have already been given it would appear that *H. influenzae* is not the cause of epidemic influenza. This micro-organism may cause disease in the respiratory or cerebro-spinal tracts. It can cause infection and death of experimental animals, but there is no evidence that it alone is the cause of epidemic influenza. It may have importance on occasion as a secondary invader and may have had a synergistic action in the epidemic of 1918 as it appears to have now in swine influenza.

All the evidence at present points to a virus as the cause of epidemic influenza. This is rendered extremely probable by the facts that a filterable agent causes an infection in the ferret closely resembling human influenza, that material from such sick ferrets has caused an illness identical with epidemic influenza in human beings, that the serum of convalescents will neutralize the virus, and that the virus has not been demonstrated in normal throats.

That bacteria such as *H. influenzae*, haemolytic streptococci and pneumococci may take part in the disease-process as complicating factors can hardly be doubted in view of the evidence acquired in 1918 and by consideration of present-day swine influenza which is caused by the interaction of a virus (which itself closely resembles human influenza virus) and *H. influenzae suis*; but in neither human nor animal types of the disease is there any evidence that a bacterium is the primary causative agent.

There is circumstantial evidence that the 1918 epidemic of influenza in human beings was transmitted to the swine of the middle-western area of the U.S.A., where it has survived as swine influenza, closely related to and yet distinct from present-day epidemic human influenza. If this be the case, it opens up very interesting and important possibilities. If it is possible for human beings to transmit to an animal what is for it a new disease, it may prove to be equally possible for animals to transmit to humans a disease new to man. This may eventually prove to have been the actual origin of epidemics such as the influenza of 1918, for in view of the then world-wide incidence of this disease, it is wholly possible that we were dealing in that year

with a virus new to man. It is therefore not outside the bounds of possibility that an animal virus which became adapted to human beings (and there is evidence that viruses may require adaptation before they will "take" in another animal species) was originally the cause of the pandemic.

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# An Experiment in Health Teaching in Ontario\*

## Part I: The Background of the Experiment

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IN outlining this development, I desire to refer briefly to those conditions which may have affected, either favourably or otherwise, the educational program in Ontario. This province comprises an area of 407,262 square miles and is 1,050 miles in its longest diameter. The computed population is 3,524,000, sixty per cent. of which reside in municipalities described as urban. Five-sixths of the area is sparsely settled. The elementary school population is approximately 585,000, which is presumed to be about 90 per cent. of those between 5-14 years of age. These children are housed in 7,162 schools, 6,119 of which are rural and ungraded. The number of teachers actually engaged in teaching in these primary schools is 17,220, 81 per cent. of whom are females. The professional qualifications of the teaching staff are as follows: university graduation, 399; first-class certificate, 5,441; second-class certificate, 10,758; third-class, 477; temporary, 158. The average teaching experience, estimated in years, in the last year for which data were available, is: urban, 14½ years; rural, 6 years.

Of the age-group 15 to 19 years, 21.5 per cent. are in the ordinary high schools, 10 per cent. are in the vocational or technical schools, and 3 per cent. are rounding out their scholastic training by attendance at what are known as "continuation" schools. These data are in favourable contrast to the figures for the year 1928, when the total secondary school population comprised only 28.5 per cent. of the eligible age-group.

For the purpose of administration, the province is divided into forty-five counties and eleven districts; the latter comprise the less thickly populated portions of the province. Each of these counties is further divided into townships. Cities, towns or villages are considered as separate municipal entities and in no way related to the township in which they may be situated. Each of these is autonomous in respect to the administration of such educational responsibilities as are vested in the local authorities. The township, for educational purpose, is divided into school sections, the number of which is dependent on the size of the township. Each school section is vested with the same measure of educational authority as is the largest urban centre. Neither the county nor the elected representatives of the township have any directional responsibility as to the local school program.

Inspectors, of whom there are approximately one hundred and fifty in the province, are, with few exceptions, permanent members of the staff of the pro-

\*Symposium presented at a meeting of the New York Society for the Experimental Study of Education, New York University, New York, April 3, 1936. The statistical data have been revised to December 31, 1936.

vincial department and are charged with certain fixed duties; for example, the regular review of the qualifications of the staff, the state of the building, the adherence to the curriculum, the recommending of grants and the interpretation of the regulations to the school trustee boards. The inspectorial influence is greater than might even be imagined.

#### THE LACK OF HEALTH TEACHING IN ELEMENTARY SCHOOLS

My original interest in the subject of health teaching is associated with the early days of school medical inspection in Ontario. I was for five years a school medical officer under the local Board of Education in Toronto and as such was appreciative of the apparent lack of concern exhibited by the teaching group in the present or future well-being of the pupils under their charge. In those days the interest of the average school principal in the subject of health was divided between the prompt exclusion of communicables and the rapid response of the school physician or nurse in the event of an emergency; while the teacher was largely concerned with the amount of time stolen from the curriculum by our entry into the classroom. My impression was undoubtedly influenced by bias; but as noted in my first public presentation of the subject of which there is any available record, some nineteen years ago, I implied that, in the main, she was content if her flock remained intact for the time allotted to their stay in her particular room; and that her contribution was confined to seeing that little Johnnie brought a note when he was absent; that he went through certain stereotyped movements often enough so that when the supervisor or drill inspector made his annual visit to the school the pupils would be reasonably familiar with the exercises which were supposedly designed to meet the physical activities of the particular grade of which she was in charge. Some of them did, apparently, make reference on occasion to physiology and anatomy, with special emphasis to the horror of alcohol and tobacco. The wearing of rubbers in the classroom was interdicted because it caused defective vision and the child with otorrhea became a classroom concern because of the odour associated with the discharge.

Later, I joined the staff of the late Dr. Charles J. Hastings, City Medical Health Officer in Toronto, and acquired a smattering of public health, only to be ultimately assigned the directional responsibility for the local school health program. It was then as an advocate of its merits that I was compelled to enumerate the objectives of this essential health service. You recall them:

The detection and correction of physical defects.

The establishment of all measures designed to control communicable disease and the maintenance of good hygienic conditions in the school.

The supervision of handicapped children and an active interest in any educational effort designed to affect favourably the future health of the pupil.

When, on occasion, I became retrospective, I sensed that I was not alone in my feeling of distress at the absence of any serious attempt at formal or informal health instruction in the elementary school. Equal concern was exhibited by some of those associated with me in the direction of the school health service. Their interest resulted in an interpretation of the last of the objectives mentioned, which ultimately brought about a condition of affairs which was almost peculiar to Ontario, namely, the assumption of the respon-

sibility for such teaching by the school health staff. Originating as a temporary expedient, it rapidly became a prerogative. It has taken all our best efforts to undo the unfortunate influence of this policy.

#### THE MISTAKE OF PLACING ALL RESPONSIBILITY FOR HEALTH TEACHING ON THE SCHOOL HEALTH STAFF

In my early administrative days, I was influenced by those ardent advocates of this doctrine, who, in their unrestrained enthusiasm, constantly emphasized the contribution to be made by school medical and nursing supervision to the present and future health of those children who might be subjected to its influence. Wittingly or otherwise, I became, to some extent at least, imbued with their enthusiasm and I found myself reciting glibly the manifest advantages of handing over to those associated with this suggested auxiliary to the school system the responsibility for inculcating into supposedly susceptible children desirable health practices and attitudes. I can recall in my advocacy of school health supervision, reciting the list of objectives and emphasizing the role of the school health staff as teachers.

Then, some fifteen years ago, as Chief School Medical Officer for Ontario, I found my contact with those directing the educational program of the province more intimate; and an astute, but kindly, pedagogue turned administrator asked me to defend my presumption that doctors, dentists and nurses were the logical individuals to influence either the present or future health behaviour of children of school age. At first, I viewed with a measure of resentment his failure to accept my proposed panacea; then, with concern; and with respect only when he had passed on.

The resulting doubt in the belief that those I represented were the best qualified to lead the next generation into the paths of health interest, was my first manifestation of heresy. When first I became conscious that perhaps my previous conception of the contribution of the school health staff needed re-adjustment, I recalled that I had never been permitted to hear one of my staff give a health talk and I remembered my own feeling of inadequacy when asked to address a classroom of children on any health subject.

#### THE TEACHER—THE LOGICAL INSTRUCTOR IN HEALTH

I understand that the path from heresy to iconoclasm is downhill; and I recall the attitude of sorrowing concern exhibited by some of those previously mentioned associates when I haltingly confided my disbeliefs in the saving grace of the faith to whose tenets they so strongly subscribed. Here might I say that I am wholly conscious of the significance of the contribution which can be made to the improvement of the physical status of the school-age child by those who play a part in the program of school health supervision. My belief in the importance of this contribution has never wavered. I am only critical of the idea that they are the logical agents to direct the presumably normal child into channels of permanent health interest. Desirable auxiliaries—yes; but an acceptable substitute for an informed, concerned teacher—no!



A change in environment, due to my transfer from the provincial Department of Education to the provincial Department of Health, with new administrative responsibilities, resulted in a period of compulsory quiescence and a diversion of my interest in health instruction into new channels, namely, maternal and infant hygiene. My colleagues in the field of school health supervision were, for a period, therefore, spared any material manifestation of doctrinal disbelief.

However, some seven or eight years ago, I was again prompted to become introspective in the matter of our approach to the problem of more effective health teaching in the elementary school. The results of such introspection are presented here because they were an influencing factor in bringing about the present program in Ontario—if what we have accomplished can as yet be described as a program.

First, may I say that the compulsory transfer from the Department of Education to the Department of Health of the responsibility for official interest in the health of the school age-group was resented by practically all of my administrative associates in the first-mentioned department and my status among them improved over night. My natural continued assumption of the position of consultant in all matters having a school health angle, strengthened what was at first a fragile bond between the two departments.

Despite the fact that one constantly overheard platitudinous presentations from those in authority in this field, in which they loudly proclaimed its fundamental significance; and aptly ended their presentations with the hackneyed quotation "*Mens sana in corpore sano*", or something equivalent; there was little evidence that such authorities were seeking early opportunity to dispute the claims which we as health workers had so insistently made as to our place in the teaching of health.

The lesser authorities exhibited even less in the way of interest with the exception of a relatively small percentage of teachers, composed chiefly of recent entrants to the profession, who believed literally that the purpose of the educational system was to prepare the subscribing student to meet more adequately future situations, whether they might be social, cultural or economic. Many of these, realizing their inadequacies, sought help from any available agency purporting to have anything in the way of aid to offer.

Such voluntary health agencies as the Junior Red Cross, the Child Welfare Council, etc., had further fired others with an urge to try out some of the acceptable aids to habit formation and practice promotion.

The older and more stereotyped members of the profession—the principals and the inspectors, had, however, continued to accept us at our own original valuation.

The subject, at this time, had a trivial place on the curriculum in the lower grades and received slightly more serious consideration in the upper. It was said to be related to physical training; the extent of such intimacy was, in actual practice, difficult to establish.

Let us remember, in any presumed criticism, that the teacher had at no time been exposed to any influence, either at home or during her elementary, secondary or normal school training, that would arouse in her a sense of responsibility for the health of the pupil. She was, as previously stated, unduly

impressed with the ill-effects of alcohol and tobacco and the health advantages of cleanliness. She confused comfort with health and considered as synonymous those things that offended the aesthetic sense and those that constituted a possible health hazard. Further, she had been encouraged to believe that the home and the official health agencies were charged with the responsibility of the health of the child; and the school health staff were the representatives of the local authorities. But I have rambled in an inconsequential fashion long enough. You are interested only in what we have done and how we did it. While the responsibility for answering these questions has been largely left to the other participants in this symposium, I am permitted to recite briefly our accomplishments in order of their sequence.

#### WHAT HAS BEEN ACCOMPLISHED

Our task was to establish a sense of concern on the part of the school in not only the present physical condition but the future health behaviour of the pupil; to fix the extent of the contribution to be made to such a plan by all those who might be considered as having anything to offer and to prepare the teacher to assume her rightful place in such a program. We were primarily prompted in doing this because we had persuaded ourselves, or been persuaded, that success in the field of disease prevention lay in the ready response of a pliable public to sound suggestion.

Our first evidence of success was noted when those responsible for the direction of the teacher-training schools granted our request that we be allowed to supplement the instruction in hygiene and physiology being given in such schools.

This was followed later by an effort to appraise the teaching value of certain material which was readily available to enquiring teachers through official and voluntary agencies and commercial organizations. The formation of a Joint Committee of representatives of the Departments of Education and Health to consider the subject of health teaching in elementary schools was the next important development. Its formation was followed by the authorization of a summer course in health teaching and the giving of definite status to the course. The action of the Department of Education in delegating to the Department of Health the responsibility for passing judgment on the health of those seeking admission to the teacher-training schools demonstrates not only the intimacy of the relationship now existing between these two significant departments of Government, but is a further proof of the growing belief that we are on the way to approximate our first objective.

The appointment of three members of the Joint Committee on Health Education charged with the preparation of a curriculum for intermediate schools is a further evidence of the recognition by the Department of Education of the importance of health education and the intimacy of the relationship now existing between the two departments.

Referred to briefly, our efforts sound rather trivial and not worthy of special comment, but I ask you to remember that change in educational procedure must of necessity be slow; that our activities were not considered to be what may be described as our major official duties and that the heads of the Depart-

ment of which we were a part were unappreciative as to the extent of the time and effort being devoted to such activities; that we were officers of one department of government presumably attempting to point out to the officers of another their responsibilities. I do not wish to imply that we were without friends at court in the Department of Education. Much of our success can be ascribed to the continued interest of the Chief Inspector of Public and Separate Schools in Ontario, who was without bias in his review of our suggestions.

Conscious of the thinness of the ice upon which we were attempting to skate, we viewed with temerity every step we made. It was my role to act as critic—it's a habit that grows on one. I believe, now, that our own self-criticism was our salvation. While the previously referred to objectives may have originally been more vague than I inferred, ultimately they became less obscure and our goal more clearly defined. During our efforts not only have we tried to avoid the possible presumption that we were attempting to tell our educational friends how their job should be done; we believe that we have never really divorced ourselves from our own task as professional health workers. We have avoided dogmatism, eschewed empiricism, accepted criticism and we continue to hope that someone better qualified than we are will carry on from the point we have reached and beyond which it would be presumption for us to go.

There has been some criticism of our program from those school physicians and nurses who were content to subscribe to the belief that they, as authorities in the realm of therapeutic medicine, were the logical instructors in the field of positive health, irrespective of the particular age-group affected.

#### RELATIONSHIP TO PHYSICAL EDUCATION

Our relations with those in charge of the program of physical instruction in the school have not been as intimate as I should have liked. We enthusiastically subscribe to the need for physical activity in the child, the youth and adult; we willingly admit that interest in such activity may have to be guided, but we cannot accept any program which is unapplicable to the 6,000 rural schools in the province. Our interest in ensuring a well-defined place for the specialist in physical instruction in the program is dampened by our contact with those apparently accepted members of this group who appear to believe that activity, either free or directed, for the mass of children consists of formal exercises in the classroom and watching the school team play that of its neighbouring rival on a nearby athletic field.

However, we have kept plugging away until we have even won the notice of textbook publishers and our presence here to-night is another hopeful sign, for it is not often that a troupe which has played only in the provinces is invited to show its wares on Broadway.

#### ESSENTIALS OF A SUCCESSFUL PLAN OF HEALTH EDUCATION

Before I conclude I am tempted to make two or three comments, only one of which I am prepared seriously to defend.

Firstly, that any ultimately effective scheme of health education must be country-wide in its application. It, therefore, must be built around the grade teacher, not the specialist.

Secondly, that such a scheme will be compounded of the best ingredients that the physician, the dentist, the nurse, the physical educator, the psychologist, the psychiatrist and the teacher have to offer, designed to be willingly taken, not forcibly or surreptitiously administered.

Thirdly, that such sound health teaching has little opportunity for fruition in an educational system, the success of which is measured solely by the continued rapid progression of the original raw material through the assigned grades.

Fourthly, that a well concerted effort must be made to create a new concept in the public mind of what the school might properly have to offer.

Fifthly, that in view of the concern with disease and the manifest lack of interest in health on the part of the average individual, it might be wise to consider if we have not been swinging a little too far to the left in our enthusiasm for positive teaching and abhorrence of the negative.

Lastly, there have always been individuals with vision in the field of education who were appreciative of the need for change, but, speaking for the Province of Ontario, at no time were they in such force as to-day.

In conclusion, I want to say that I am likely to concur in your ultimate opinion that we in Ontario have done nothing unique; nothing that I would suggest that you try to emulate; in fact, nothing that can even boast of originality. We have merely taken advantage of existing circumstances to make a rather out-of-the-ordinary, but not necessarily more effective, approach to the problem of health education as it affects the school-age group.

## Part II: The Experiment\*

MARY POWER, B.A., AND R. H. ROBERTS, M.A.

*Department of Health*

*Department of Education*

THE experiment had its beginning in December, 1929. Dr. Phair has outlined the factors leading to its initiation. The conclusion had been reached that the policy of the Division of Health Education, whereby posters were loaned to teachers on request, was a questionable one. The feeling existed that the responsibility of the Department extended to the point where the material supplied would be not only scientifically accurate but pedagogically sound. All service to teachers was discontinued. Following visits of study and observation made possible through the provision of a Rockefeller travelling fellowship for one of us [Miss Power] and the attendance of Miss L. W. Vrooman, Reg.N., of the Division of Child Hygiene at the course in health education at the Massachusetts Institute of Technology, steps were taken to determine what would be the most suitable approach to the subject.

An appraisal of teaching aids lent by the Department was made through the co-operation of a group of teachers and the findings were submitted to the Department of Education. As a result, the latter department committed

\*Abstract of addresses.

themselves to participation in a piece of controlled experimental work to be carried on by the Department of Health. This co-operation depended in no small measure on confidence of the Department of Education in Dr. Phair as their consultant and adviser; another essential factor was the interest and support of Dr. W. J. Bell, then Deputy Minister of Health.

The effort to determine the effectiveness of the proposed program of health teaching involved its trial in city, town, village, and rural schools. More than 2,500 children accommodated in 61 classrooms were included in the Demonstration and the work was carried on during eight months—from September, 1931, to April, 1932. Each teacher was supplied with carefully selected materials and suggested aids to supplement the outline of instruction for the grade. The teacher was asked to evaluate the material supplied, it being felt that everything used in the study should be critically reviewed by the teacher. The inspectors in six areas chosen were kept advised of the progress of the work and the teachers were visited twice by those in charge of the experiment. Not only was the material evaluated but information was sought from the teachers which would permit of the program itself being subjected to intimate criticism. Constructive suggestions were sought. Two of these related to the preparation of a handbook and the providing of a summer course.

#### THE DEMONSTRATION FINDINGS—BASIS FOR FURTHER EXPERIMENTAL WORK

The sixty-one teachers participating in the Demonstration may be considered as a cross-section of the elementary teachers of Ontario; it may safely be said, therefore: (1) that there is general interest in the subject of health teaching; (2) teachers are striving to find a plan whereby the subject may be presented more adequately than is possible under existing conditions where the only available aid is an ungraded text and any free or inexpensive material the teacher may secure from voluntary or commercial agencies.

Non-participating teachers in both urban and rural schools asked for the use of outline and material for their classes. The Demonstration impressed the teachers with the possibility of arousing in the child an interest in himself and things affecting his growth and accomplishments. From the first the program was popular with the child. There was marked improvement in personal appearance of the pupils in the Demonstration units; this was commented on by teachers, principals and inspectors.

Despite the best efforts of the inspector, the insanitary conditions and lack of sanitary facilities in many schools were such that the best health teaching would fail in its objective.

#### APPOINTMENT OF A JOINT COMMITTEE

Those associated with the study made no definite recommendations in the report but suggested that the Department of Education appoint one or more members of its staff to discuss with them the report and its findings. As a result of the consideration of the findings by the two departments, a Joint Committee was named by the Prime Minister. It consisted of the Director of Professional Training and the Chief Inspector of Public and Separate Schools as consultant members from the Department of Education, and the Director

of the Division of Child Hygiene as a consultant member from the Department of Health. The members of the working committee were Mr. R. G. Smith, Instructor at the Normal School, Ottawa; Mr. R. H. Roberts, Inspector of Public Schools; Miss L. W. Vrooman, Division of Child Hygiene; and Miss Mary Power, Director of the Division of Health Education.

#### ACTIVITIES OF THE JOINT COMMITTEE

##### *Summer School for Teachers-in-Service*

Recognizing that the responsibility for health education rests upon the teaching body, the Joint Committee recommended to the Minister of Education in 1932 that a course in health teaching leading to an elementary certificate in the subject be included in the summer courses for teachers. Approval was given and in July, 1933, the first course was provided, Dr. J. T. Phair being designated principal. A handbook which was in the process of preparation was used as an outline for the teachers in this course.

How to reach the seventeen thousand teachers of the Province was a challenging problem. The plan followed was to secure a group of representative teachers who would regard their summer school training as an experiment and who would be willing to contribute to the experiment in health education by carrying on experimental work in their own classrooms. The Chief Inspector of Public and Separate Schools requested each inspector to secure, if possible, the attendance of at least one teacher at the course. The teacher so selected should be one who had shown an unusual interest in the health of her pupils and who was recognized as a successful teacher. Each subsequent year the Chief Inspector has sent out a similar request, with the result that the three hundred and fifty-seven teachers registered in the course have been a selected group.

The enrolment has grown from 45 in 1933, 53 in 1934, and 84 in 1935 to 175 in 1936. Of the total 357 enrolled, 270 were teachers from town, village and rural schools; 82 came from city schools; 2 were instructors in hygiene in Provincial Normal Training Schools; and 2 were teachers from outside the Province. With the opening of school in September, 1936, in every county of the Province and in six of the eleven districts without county organization there was at least one teacher holding the special health teaching certificate. Teachers from twenty-two of the twenty-seven cities have attended the course. The proportion of teachers coming from the city schools is below that of town, village and rural schools. It is possible that the reason for the indifference of the city groups is due to the feeling among teachers and officials that the schools are doing adequate work in health if medical, dental and nursing services are provided. There seems to be a disposition on the part of certain city administrative officials to transfer the responsibility for health teaching from the teaching staff to that of the special services, and, in some cases, it would seem that the latter are willing to assume the responsibility.

School health education is fundamentally the work of the teacher, and school authorities are learning that, if progress is to be made in the improvement of the health of the school child, the teacher is the logical and best fitted person to undertake this work.



### Organization

Since the summer school was part of the experiment, the Committee approached the matter of organization and curriculum experimentally. Four main divisions were finally accepted and these have served as the basis of the course during the last four years.

1. The first division was not too specifically defined but was named Health Education in relation to the Work of the Elementary School.

2. The second division dealt with the technical and scientific information required by the teacher in preparation for health instruction and health service.

3. The third division was a series of demonstrations of classroom procedures and activities in health education.

4. The fourth division included field trips to provide the students with practical knowledge relating to specific community health problems.

While of necessity many of the lectures were didactic in character, the instructors were impressed with the importance of making all information readily available to the teacher for classroom use in developing habits and attitudes on the part of the pupils. Recognizing that health education has to do primarily with the formation of these habits and attitudes, life experiences of the individual and community were stressed in all lectures. The place of health education in general education was studied with the teachers in conferences and discussion. The informed teacher who is with the child throughout the school day is in a position to give the best guidance in habit formation and in the acquisition of knowledge relative to health. The health of the individual is a twenty-four-hour-day program and therefore effective work can be done only when the teacher utilizes the child's day-to-day experiences in the home, school and community which have significance in building up a completely integrated personality possessing a maximum of physical, mental, emotional and social health. Health is the ability of the individual to sustain adaptive effort and therefore the purpose of health education is to give significance and enrichment to the experiences of the child that through them he may attain a maximum functioning of his physical, mental, emotional and social capabilities. To meet with self-confidence and calm determination new situations as these arise in an ever-changing economic, social and moral environment, the individual must be an efficiently functioning person equipped with a rugged mind and a capacity for purposeful and harmonious living with others.

### ORGANIZATION OF SUMMER SCHOOL

#### STAFF

JOHN T. PHAIR, M.B., D.P.H., *Principal*

Chief Medical Officer of Health

Department of Health

- Subjects:
1. Preventable Disease
  2. Medical Service in the Schools
  3. School Hygiene
  4. Place of Safety in the Health Teaching Program
  5. Place of First Aid in the Health Teaching Program
  6. Place of Physical Activities in the Health Teaching Program

ROBERT H. ROBERTS, M.A., *Vice-Principal*

Inspector of Public Schools

Department of Education

- Subjects:
1. Teacher's Responsibility in Health Education
  2. Methods in Health Education

MARY POWER, B.A., *Full-time Assistant*  
Director, Division of Health Education  
Department of Health

- Subjects: 1. Health Education  
2. Materials as an aid in Health Education

LAURA W. VROOMAN, Reg. N., *Full-time Assistant*  
Division of Child Hygiene  
Department of Health

1. Discussions with the individual teacher of classroom and personal health problems  
2. Group discussions of the problems of the various grades

ALMA SMALL, *Part-time Assistant*  
Recreation Leader  
Toronto

Recreation and Physical Activities

The lecturers included Dr. A. E. Berry, Director of the Division of Sanitary Engineering, Department of Health of Ontario, who presented five lectures on Sanitation in Home, School and Community; Dr. Ernest T. Waters, Lecturer on Research in Physiology, University of Toronto, fourteen lectures on A Study of the Body and its Functions; Dr. E. W. McHenry, Assistant Professor of Physiological Hygiene, University of Toronto, four lectures on Diet and Nutrition; Dr. Edward A. Grant, Director of Dental Services, City of Toronto, three lectures on Mouth Hygiene; C. Roger Myers, M.A., Consultant Psychologist, Department of Health and Lecturer in Psychology, University of Toronto, five lectures; Harry E. Amos, B.A., D.Paed., Inspector of Auxiliary Classes, Department of Education, one lecture on provision for the care of those in need of special treatment; and Miss Pauline Brooks Williamson, School Health Bureau, Metropolitan Life Insurance Company, New York, guest lecturer on Progress of Health Teaching in the Elementary School.

*Field Trips*

The field trips included visits to a dairy farm, a milk pasteurization and distribution plant, and suburban filtration and sewage disposal plants. The original objective in visiting the dairy farm was to observe the production and care of milk under the best possible conditions of cleanliness and health. No finer example of this could be found than is provided in Don-Alda Farms where, through the kindness of Mrs. D. A. Dunlap, the students have the privilege of observing the methods followed. The production of safe milk involved problems relating to the housing of the cattle, testing of the herds, feeding, cleanliness, etc. The students observed how scientific health principles were being applied in such matters as the ventilation and cleanliness of the stables; the selection of foods; inspection of the herds; the importance of fresh air, sunshine and exercise; the medical examination of all employees. A visit to this farm was a demonstration of the application of health principles in the rearing and care of cattle, pigs and poultry. The relationship of the same principles to human beings was left for the teachers to contemplate.

A visit was made to the Museum of Science, Buffalo, N.Y. This museum now houses a replica of the famous glass man of Dresden, and other anatomical models shown at the Century of Progress Health Exhibit in Chicago. Through the courtesy of the Director the students are given special attention and guidance by the staff. This is one of the most informative and most enjoyed field trips of the course, including as it does the boat trip across Lake Ontario and drive along the Niagara River.

### *Dramatization of Medical and Nursing Services*

During the course a short play is presented demonstrating the medical examination of a child in school with parent and teacher present. Dr. Elizabeth L. Kitley and Miss Edna M. Squires, Reg. N., Division of Child Hygiene, act as physician and nurse, and students portray parent and teacher. In addition Miss Emma R. Graham, Reg. N., public health nurse of Bowmanville, and a dramatic group composed of a teacher, a mother and ten pupils from the town outline the nursing service in the school, including classroom inspection, a child's visit to the nurse's office, and a home visit.

### *Medical Examination*

In the summer of 1933 the students were offered a complete physical examination including x-ray of the chest. There was no charge for this service and acceptance was voluntary; the entire student body accepted. Facilities were not available to continue this during the summer courses of 1934 and 1935. In 1936 arrangements were made whereby the students were again offered medical examination. A nominal fee of four dollars was fixed. Where x-rays were indicated they were given free by the Tuberculosis Division of the Department of Health. Sixty students were examined. It is proposed to require all students to have a complete physical examination upon registration for attendance at future courses.

### *Service to Teachers*

Following the course the teachers are given service upon request by the Division of Health Education of the Department of Health. Through this service the teachers receive publications of the Department of Health issued from time to time which may be of value in health teaching; revised lists of publications and agencies covering health references for teachers and pupils and information regarding free and inexpensive material useful as an aid in health teaching in the classroom; help with the planning of projects and units in the classroom; loan service of (a) books and pamphlets on health education and teaching methods—for teachers, (b) supplementary readers on health—for pupils of specified grades, and (c) visual aids and devices which have been tested in the classroom and found to have value for the specified grade. Care is exercised in the matter of materials, since in the past too much reliance has been placed on these. The use of life experiences as source material in teaching health is stressed.

### *Follow-up Activities*

In order that the Committee may keep in touch with subsequent classroom teaching, members of the Joint Committee visit the schools during the year. They have been able to evaluate, to a certain extent, the effectiveness of the summer course in helping the teachers. These visits are in no way inspection visits. They afford opportunity for discussion of problems with the teacher. As far as possible the work has been maintained on the basis of an experiment, and the teachers consider their programs as contributing to the experiment. Officials of the Department of Education regard these follow-up visits favour-

ably and have offered every facility to make them worth while. Members of the Committee have found that over fifty per cent. of the teachers visited have received a maximum of benefit and are doing superior work. Approximately thirty-five per cent. have received definite personal and professional benefits but, while attempting to carry out certain aspects of the health teaching program, they have not been able to effect a complete organization of health teaching in the classroom. The reasons for this were, in the main, due to the lack of understanding and sympathy on the part of administrative officials and other teachers, and the pressure of the examination subjects on the curriculum. The remaining fifteen per cent. appear to have received certain personal benefit from the course, which was apparent in the increased regard for their own health; but these teachers lack that confidence and initiative necessary to undertake a program involving a large measure of personal responsibility.

Although it might appear that we have reached a very small number of teachers, more has been accomplished than the enrolment figures would indicate. We have already referred to the fact that the teachers who attended the courses were a selected group. They have influenced other teachers, as well as school officials and parents; many have made the school the centre of health interest and education in the community. Teachers' Institutes have given a very prominent place on their programs during the last three years to health education, and the discussions have been in charge of teachers who have attended the summer course.

#### *Health Education in the Secondary School*

While the Committee gave serious consideration to the provision of added instruction in the first and second years of the secondary school, particularly for students planning to enter the teaching profession, action was deferred as the Committee wishes to complete the organization of health education in the elementary school. However, the first step was taken by the Department of Education in 1936 when three members of the Joint Committee were named on a committee of five to draw up a course of study in health education for the intermediate school. The other members of the committee were the Instructor of Physical Education for Women at the Ontario College of Education and the Supervisor of Physical Education, City of Toronto.

#### *Preparation of a Handbook for Teachers*

The material was assembled in sections and given in mimeographed form to the students in the first summer course. It was revised in June, 1934, and during the following school year was distributed to selected teachers, principals of the Normal Training Schools, inspectors of elementary schools, and to students at the Ottawa Normal School and at the summer course. A second revision is now in progress which will incorporate changes and suggestions offered by those who have used it. Such information is obtained by the Committee through questionnaires. It is proposed to issue the handbook in loose-leaf binding and to distribute it to all classes in the elementary schools in September, 1937.

# The Fundamentals of Air Conditioning

G. H. FERGUSON, B.A.Sc.

*Chief, Public Health Engineering Division, Department of Pensions  
and National Health, Ottawa*

AIR conditioning to-day is such a topic of general discussion that articles and opinions regarding it are to be found in almost every newspaper and magazine for sale in the bookstores and news-stands. Even the man in the street who may never be able to afford it, is interested in the subject but, because of its novelty to the general public and because of the subject being so little understood, much confusion and misconception of the term have arisen. The underlying idea is to make the atmosphere comfortable and to obtain incidentally, indoors, conditions that are conducive to comfort and health.

Air conditioning not only heats and cools, not only humidifies and dehumidifies, not only cleans and purifies the air, but also concerns itself with correct circulation. Air-conditioning equipment circulates the warmed or cooled air, as conditions warrant, in such a manner that all parts of a room are kept at an even temperature.

By means of air conditioning, it is possible to have clean, fresh air in continuous circulation and also the degree of humidity most suitable to any particular season of the year and the individuals in the particular location under consideration.

Air conditioning may be defined as the simultaneous control of all, or at least the first three of those factors affecting both physical and chemical conditions of the atmosphere within any structure. These factors include temperature, humidity, motion, distribution, dust, bacteria, odours, toxic gases and ionization, most of which affect in greater or lesser degree human health or comfort.

This is a broad definition and is intended to cover all types of air-conditioning installations and it is now recognized generally throughout Canada and the United States. In other words, true air conditioning should control temperature by providing heating in winter and cooling in summer. It should control humidity by adding moisture to the air in the winter (humidifying), and by removing moisture from the air in the summer (dehumidifying). It should provide and control the air motion and air distribution throughout the year without the semblance of a draught or stagnation of the air at any point.

It should cleanse the air so as to remove or minimize the dust and bacteria; it should supply the necessary amount of fresh air for the respiration of the occupants of the conditioned space. It is also known that air-conditioning systems should control the ionic content or electrical properties of the air, but regardless of the great amount of research work carried out in this

connection, no method has as yet been devised to accomplish this desirable result.

Since all air-conditioning problems are basically those involving the exchange and conversion of heat, it is necessary to know something of the thermo-dynamic properties of air vapour mixtures. Assuming the barometrical pressure to be constant, there are three primary variables in all air-conditioning problems; viz., the dry bulb temperature, the wet bulb temperature, and the weight of water vapour mixed with each pound of dry air. From these, the relative humidity, the dew-point temperature, the total heat of the mixture and the volume of the mixture can be calculated.

Humidity has been defined as the vapour which is contained in air. Hence it follows that relative humidity is the ratio of the weight of a vapour in a given space to the weight which the same space is capable of containing when fully saturated at the same temperature.

Relative humidity may be calculated by a comparison of dry and wet bulb thermometer temperatures. If the temperature of a room increases without outside moisture being supplied, the relative humidity of the air in the room decreases. The action of this drier air on the wet bulb thermometer is to take moisture away from it and thus increase the temperature ratio. The heating of the atmosphere in the enclosed space, necessary to raise the temperature, may be supplied by the heat losses from the body.

The result of the decreased relative humidity of the air (i.e., drier air) in a room is to take moisture from the membranes of the nose and throat and thus produce discomfort and possibly endanger health.

There is also a change in the ionic content and this condition is being studied. It has been noticed that when air in a room is ventilated by mechanical means, it retains the feeling of "deadness". Now it has been found that this so-called "deadness" is caused by the decrease of ionization which mechanical means do not restore.

So as to have proper "air feeling", the air should be revitalized by electrically charging the particles of the air. It is fortunate that air has the phenomenal property of revitalizing itself, i.e., the air in a room on again being unoccupied will recover in a very short time and, of course, especially when absolutely fresh air is supplied and the stale air removed.

There are two factors which must be observed by air movement to produce comfort:

First: the maximum permissible velocity should not exceed two feet per second.

Second: the air currents should not be directed downward or allowed to strike persons at any angle, or at the floor level. Recent investigations have shown that from 10 to 20 cubic feet per person per minute is necessary, in most cases, to avoid odours. The above factors, therefore, should play a large part in the selection of the type of apparatus and the method of construction.

Consideration should also be given to the dust which is suspended in the air. Under usual conditions, dust is composed of both organic and inorganic



matter which has been picked up by the movement of the atmosphere. The removal of this dust is one of the basic considerations in air conditioning. Its importance can be appreciated by the fact that the bacteria do not float self-suspended in air, but they collect and travel upon dust particles. From this standpoint alone, it is evident that air conditioning has a definite health aspect.

The dust problem is one which is always present and there are at least three general solutions to the problem. The first and most effective method is to prevent the dust at its source. Unfortunately, however, this is usually beyond the scope of a particular air-conditioning job and something which must come about by a slow process of public education and the enforcement of specific regulations on the particular offender. The second possibility is to select the air from as clean a source as possible and thus reduce the cleaning problem. The third, and final, possibility is to clean the dirt and dust out of the air as it passes through the air-conditioning system. This is primarily the function of air filters.

For a considerable period of time, studies have been in progress regarding the effects of temperature, humidity, barometric pressure, air motion, dust, odours, etc., on the human body, as well as with regard to comfort itself. As a result, the physiological effect of various degrees of temperature, humidity, etc., on the human body has been observed and the conditions most favourable to human comfort and health determined.

It will be necessary to give more attention than in the past to the construction and insulation of the walls, floors, ceilings and windows of our houses and office buildings when we are planning air conditioning for room comfort. Such attention is even more important for successful winter air conditioning than it is for summer air conditioning. The air conditioning of the future must provide for both conditions, for all-year-round service.

While the cost of year-round air-conditioning systems is fairly high, at the present time the tendency of the equipment makers is towards greater production, lower manufacturing costs and reduced costs of installation.

Air conditioning in its application to passenger cars on railroad trains has received much attention, and time and money have been spent on special studies and research work by specialists engaged for the purpose by the American Association of Railroads. Recently the Pullman Company, which manufactures so many sleeping cars, has added a professional sanitary engineer to its staff, to aid in the solution of problems arising in air conditioning of cars. According to statements appearing in the daily newspapers, air conditioning will be extended in 1937 to all branches of railway passenger service including standard sleepers, dining cars, parlor cars, tourist sleepers and day coaches.

In air conditioning for human comfort, it must be constantly kept in mind that the sole purpose of the application of air conditioning is to give the individual pleasant, healthful and comfortable surroundings. The proper function of a heating or cooling plant is, therefore, not to warm or cool the body, but to produce an environment in which the body is enabled to lose

the amount of heat corresponding to that generated, without any conscious bodily adjustments having to be made.

Any such annoyance as undue noise from the equipment, or even the sight of unpleasant equipment within the occupied space, may entirely defeat the advantages otherwise gained by making the occupant conscious of the presence of the equipment to the extent that it becomes annoying. This fact must be constantly kept in the foreground in the application of air conditioning for human comfort.

Fundamentally, air conditioning is an engineering problem requiring a thorough knowledge of its principles and practice and a sound knowledge and extensive experience with air motion and distribution.

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## Staff Education in Public Health Nursing\*

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PROVISIONS for staff education are made not only by professional groups but also by commercial concerns. In industry the efforts are generally more highly developed than in the professional groups since there is greater encouragement offered and the undertaking is definitely promoted by the firms concerned. Within the professional groups there is less evidence of organized staff education. The reasons are apparent. Business and industrial concerns have their staffs in close contact with each other. In contrast, except for that professional life which is found within our institutions or in closely related work, the professional worker such as the nurse or the teacher is apt to become a lone worker. One therefore asks: Is staff education for the professional worker provided satisfactorily in Canada? Is there need for an educational program among graduates and, if so, are such programs available?

Staff education for public health nurses in Canada may be arranged in three classifications: the city group, the small-town and rural group, and the nurse working alone. In this discussion I shall deal mainly with the third group—the nurse serving alone in rural communities. This, the group with which I am most familiar, presents the greatest problem in this respect.

The object of a director or supervisor should be to provide a plan that will make it possible to meet every member of the staff at suitable intervals. An

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integral part of the plan is a program of staff education. The question is at once raised: to what extent can a program of staff education be made available to all members of the staff?

#### CONFERENCES, REFRESHER COURSES, AND NEWS-LETTERS

The annual convention of the provincial or national health association offers a valuable means of staff education, although attendance at such conventions is not always possible for public health nurses. In many centres an annual refresher course is provided. Conferences and institutes may be held, and if there is a supervisor in the field periodic visits and check-ups may be made. Due to distance and pressure of work, it is not always possible for a nurse to attend a central conference and in such cases the group conference is found to be of great value. Four or five nurses meeting with a supervisor can spend a very profitable time. This method can be applied to neighbouring rural districts.

Another method of reaching a group is by a monthly news-letter or bulletin. These letters can be of great value in stimulating interest among the staff, in presenting teaching principles, and in publishing contributions from the nurses themselves. Where this method has been used, it has proved most useful.

#### THE DEMONSTRATION TRAINING-CENTRE

The public health nurse does not always get sufficient practice in teaching before she receives a staff appointment. At university, to be sure, some practice work is given but the environment she enters in her new field is usually entirely different from that provided while at university. It would be of great value, therefore, if each organization could establish a teaching centre where the nurse could receive further training in health teaching and be initiated into the routine and practice of the organization's particular viewpoint and problems. This centre might be used also as a laboratory or workshop to which the staff nurse might return periodically for closely supervised work.

I have in mind such a centre as that at Alder Flats, situated 125 miles southwest of Edmonton in Alberta. When a community wishes to have a nurse, it first complies with certain requirements and agrees to build a cottage, keep it furnished, and provide fuel. The Alberta Association of Registered Nurses recommends a nurse, and provides a small remuneration to cover her expenses. The student in public health nursing stays at Alder Flats for from five to six months and observes something of public health nursing as it is provided in the district.

Such an enterprise as Alder Flats could with advantage be used not only as a demonstration centre for the public health nurse about to enter the active field but also as a refresher course for the nurse who, isolated, has lost contact with current practices. Such a teaching centre could be modified to meet particular staff requirements and circumstances.

## EXTENSION LIBRARIES

Is reading sufficiently stressed and planned? What provision is made to keep this means of education before a staff? We assume that each organization has its own library. A supervisor might select twelve books, which would deal in the main with technical subjects although the selection might include one good novel, a book of travel, and a biography. These books could be distributed among twelve members of the staff with the purpose of having a short review of each book sent to the office. The reviews could be published in the monthly news-letter and thus reach the entire staff, making the news-letter a greater means of education and communication and also stimulating an interest in reading.

## GREATER UTILIZATION OF TRAINING SCHOOLS

Then there is the possible utilization of our hospitals, permitting the staff nurse to return and participate actively in institutional routines, for no matter how fully a public health nurse may be occupied with a teaching program in her daily work, she is still regarded (and we hope that she will always be) as a well trained nurse. She cannot afford, therefore, to disregard her hospital-nursing skill and the need for increased training and education in obstetrical nursing, which the ever-present question of maternal mortality urges us to emphasize. Are we meeting this problem as we should?

Other valuable means of staff education, very limited it is true, are the provision of scholarships, leaves of absence for study and research, and exchange of nurses in public health throughout the Empire.

## SUMMARY

A planned program of staff education which gives opportunity for active participation on the part of the staff should be provided. The following suggestions are made:

1. Attendance at provincial conventions.
2. A yearly refresher-course with staff members making a contribution through active participation.
3. Conferences of small groups in districts.
4. A demonstration-centre for training and for a practical refresher course.
5. A monthly news-letter or bulletin.
6. Planned reading.
7. Greater utilization of training schools for the public health nurse, whereby bedside nursing and public health may have greater correlation.
8. The provision of scholarships and leaves of absence with salary for study and research, and the exchange of public health nurses within the Empire.

# Further Observations on Staphylococcic Infections of the Bovine Udder\*

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LAST year Gwatkin, Hadwen and LeGard (1) reported 30 cases of staphylococcic mastitis, 20 of which occurred in two herds in which no other pathogenic organisms were isolated. In continuing this work we found 19 cases of mastitis in the next 260 cows which appeared to be due to staphylococci (7.3 per cent.). The same methods of examination were used as with the animals previously reported, and the milk samples, blood and cultures dealt with in this paper were obtained in the course of our joint work.

## FERMENTATION OF MANNITOL

In the previous paper the fermentation reactions of 131 cultures of staphylococci were reported. Ninety-four fermented mannitol and only 5.3 per cent. of these strains were isolated from apparently normal udders, while 46 per cent. of the mannitol-negative strains were so obtained. Results of the examination of a further 144 strains is shown in table I.

TABLE I  
FERMENTATION OF MANNITOL BY *Staphylococcus Pyogenes*

Source	Mannitol +		Mannitol -	
	Orange	White	Orange	White
Staphylococcic mastitis.....	47	3	5*	
Streptococcic mastitis.....	14		5	
Suspicious.....	8	5	3	1
Clean.....	14	5	30	4
Total.....	83	13	43	5

\*Mannitol+ strains also isolated from 2 of these cows. In a third animal, infection had followed a teat injury.

From this table it will be seen that about 80 per cent. of the positive strains were isolated from abnormal udders and 20 per cent. from those apparently normal. It is probable that special conditions are required before some of these strains can cause infection.

Five of the 48 negative strains were recovered from cases of staphylococcic infection but in two instances positive strains were also recovered from the same quarter; another infection followed a teat injury. Seventy per cent. of the negative strains came from apparently normal cows, and if the two cases

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in which positive strains also were isolated are deducted, there remain 3 (6.2 per cent.) negative strains which actually appeared to be of aetiological importance.

Grouping together the findings of our two studies, 275 strains have been examined, 190 of which were mannitol-positive and 85 mannitol-negative. Twenty-four (12.6 per cent.) of the positive group were recovered from apparently normal udders and 51 (60 per cent.) of the negative strains were obtained from this source. The former is probably the more significant figure because negative strains were recovered from a number of cases in which they probably had no aetiological relationship. It is evident that while the majority of positive strains come from cases of specific infection, they may also be recovered from apparently healthy udders. In spite of this, mannitol fermentation appears to have some practical value in forming an opinion as to the aetiological importance of the staphylococci under examination.

#### ENTEROTOXIC STRAINS

Stone (2) suggested a cultural method for the classification of staphylococci on the basis of whether or not they are of the "food poisoning type". Briefly, the method consists of seeding tubes of special beef extract-gelatin medium with the suspected organism and incubating for 24 hours at 37.5°C. The tubes are chilled and any degree of liquefaction, after the controls have solidified, is considered positive evidence of a "food poisoning strain". A modification of this method by the use of beef extract-gelatin-agar plates has been described in which Stone (3) makes use of the Frazier principle of combining agar with the gelatin. Plates are incubated 24 hours at 37.5°C. and then treated with ammonium sulphate solution. After exposure for 5 minutes to ammonium sulphate solution the medium becomes opaque and yellowish and clear zones appear around colonies that produce the gastro-enterotoxic substance. Well-marked zones which approximate a radius of at least one-eighth inch from the edge of the colony are considered by Stone as positive, while zoning of lesser degree is considered significant but not necessarily positive.

The two media were prepared in this laboratory according to the formulae in the references cited above, and 65 strains of staphylococci were tested. Most of the strains were examined at the time that kitten tests as described by Dolman, Wilson and Cockcroft (4) were made, but in some instances this examination had been made a week earlier.

Forty strains showed some zone formation on plates. Eleven of these caused partial or complete liquefaction of the gelatin tubes and 29 showed no liquefaction after an additional 24 hours' incubation. Twenty-five showed no zone on plates and no liquefaction in tubes.

Thirty of these strains were grown on semi-solid beef infusion agar in O-CO<sub>2</sub> atmosphere as recommended by Dolman (5), with the difference that the medium was not heated to the coagulation point until it was put in the boiling-water bath after incubation. The filtrates were tested for haemolytic units and combining-power with standard antitoxin. All were low in both respects.



Seventeen of the filtrates were held in a boiling-water bath for 30 minutes to destroy  $\alpha$  and  $\beta$  toxin and were then used for the kitten-injection test.

Kittens of between 3 and 4 months of age were given intraperitoneal injections of 3 cc. of filtrate. Kittens were used only once for this purpose. Four were given injections of unseeded medium which had been treated in the same manner. One of these last showed some discomfort for about 5 minutes, occasionally rolling over as if in pain, but remained otherwise bright and alert, as did the other three which showed no symptoms of any kind. All except one

TABLE II  
RESULTS OF GELATIN AND KITTEN-INJECTION TESTS

No.	Source	Gelatin		Effect on Kittens
		Zone	Tube	
71	Fatal staphylococcic mastitis	Well-marked	+	Only the lassitude exhibited by all the kittens receiving filtrate.
96	Staphylococcic mastitis	"	+	Pain and uneasiness at first. Finally lassitude. Liquid stools 20 to 35 mins. after injection.
510	"	"	+	Vomited twice 1½ hours after injection.
97	"	"	+	Lassitude only.
626	Probable staphylococcic infection	"	-	Shivering 45 mins. after injection. Vomiting ½ hour later. Vomited at least 12 times. Finally blood in vomitus.
691	Staphylococcic mastitis	"	+	Lassitude only.
673	Normal udder	"	-	" "
674	"	"	-	" "
690	Staphylococcic mastitis	"	-	" "
652	Normal udder	Less marked	-	" "
610	Staphylococcic mastitis	"	+	" "
693	"	Slight	+	" "
689	"	Trace	-	Vomited twice 15 mins. apart about 1½ hours after injection. (Worms in vomitus.)
627	Probable staphylococcic infection	-	-	Vomited twice commencing about 1 hour after injection. (Worms in vomitus.)
650	Slight staphylococcic infection	-	-	Vomited once about 1 hour after injection.
678	Normal udder	-	-	Lassitude only.
688	Suspicious udder	-	-	Some attempt to vomit shortly after injection. Vomited once during night.
	4 controls—boiled medium			One showed some pain. No lassitude. No symptoms in others.

+Complete or partial liquefaction.

-No zone or no liquefaction of gelatin.

of the kittens receiving filtrate evidenced lassitude shortly after injection. This was in marked contrast to their pre-injection activity. Before injection they were trying to get out of the cages but shortly after the injection they became sleepy and lay down, and nothing that was done attracted their attention. In contrast, control kittens receiving the boiled medium continued in normal activity. One kitten receiving filtrate showed uneasiness and pain, rolling over and clawing for about 30 minutes, after which it became sleepy. Seven of the kittens showed some gastro-intestinal disturbance. All the strains used were from different cows with the exception of nos. 626 and 627, which

came from different quarters of the same cow. This animal probably had a staphylococcal infection but we have not included it as such until the identification is established. The gelatin reactions and kitten-injection tests are presented in table II.

All the kittens with the exception of no. 626 appeared well on the following morning, but this animal was still weak and ill. It was chloroformed and post-mortem examination was negative, except that there was possibly more mucus in the intestinal tract than normal.

Seven of the 17 kittens receiving filtrate showed some gastro-intestinal disturbance. Two had received strains that showed well-marked zones and liquefied the tube of gelatin. The most severe case, no. 626, had received a strain which showed a well-marked zone on the plate but which did not cause liquefaction of the tube of gelatin. One kitten that received a strain that produced a trace of zone and no tube liquefaction vomited, but there were roundworms in the vomitus. Three kittens which received zone and tube-negative strains vomited. One of these had worms in the vomitus.

It is apparent that roundworm infestation, so common in cats, should be taken into consideration in connection with the kitten-test because vomiting is one symptom of the condition. Difficulty was experienced in obtaining kittens at the time this work was done and we were unable to compare the effects of feeding filtrates with the results following injection or to repeat the injections.

Allowing for the two animals that had worms in the vomitus there were still 5 kittens that showed some evidence of upset and 2 of these had received zone and tube-negative strains. Dolman (6) refers to the production of enterotoxin by a strain which failed to liquefy gelatin by Stone's method.

Whether all the reactions were due to a specific enterotoxic substance the writer does not pretend to know. As already pointed out, all the filtrates produced a condition of lassitude in the kittens and one may wonder if some of the slight gastric disturbances were a part of this reaction. If not, one must be prepared to find a considerable number of potentially enterotoxic strains. There is no question, however, of the violent and persistent sickness of no. 626, which fits in well with the syndrome described by Dolman.

#### SEROLOGICAL TESTS

##### *Agglutination and Complement-Fixation Tests*

Agglutination and complement-fixation tests were carried out on 30 samples of blood serum and 60 of whey, from clean and streptococcus and staphylococcus infected cows, using *Staphylococcus aureus* and *Streptococcus mastitidis* as antigens. Results in all cases were negative. Mitchell, Humphreys and Walker (7) reported the absence of specific agglutinins in the mammary glands of animals infected with *Streptococcus mastitidis*.

Whey was next used as antigen in the complement-fixation test with known streptococcus and staphylococcus serum and also staphylococcus antitoxin. No reactions were obtained with the streptococcus serum nor with the staphylococcus antitoxin but there were some reactions in a few cases of staphy-

lococcus infection with staphylococcus serum. However, some of these occurred in apparently uninfected quarters and it soon became evident that the procedure was not of value. The anti-complementary tendency of whey made it difficult to use it in as low a dilution as seemed desirable for this purpose.

#### *Opsonic Activity of Whey*

Twelve samples of whey from clean cows and cows infected with streptococci and staphylococci were tested against these two organisms with rabbit leucocytes by Wright's method. There did not appear to be any difference between the various samples, a few bacteria of each kind being engulfed by the occasional white cell in the presence of each sample of whey. The blood serum of these animals was not tested.

#### *Staphylococcus Antitoxin in Blood and Milk*

Forty-two samples of blood were obtained from the abattoir from heifers and steers. There was no opportunity to examine them but, as a group of young cattle, it was thought that they would give some idea of the content of staphylococcus antitoxin in presumably non-infected animals.

The samples were tested against a standard toxin obtained from Dr. J. S. Kitching of the Connaught Laboratories and by one of the methods in use at that institution. Briefly, undiluted serum and serial dilutions were tested against the established Lh dose of toxin with both rabbit and sheep cells in concentration of 1 per cent. While there is a considerable gap between the higher dilutions, this was the most expeditious method with unknown sera and, as most of the reactions fell in the lower dilutions, the method proved to be very satisfactory for our purpose. The results given here are in terms of the International Standard Unit of antitoxin (8). The results with sheep cells or the  $\beta$  antitoxin content, for which there is no standard, are reserved for further study. Eleven of the 42 abattoir samples had less than 0.6 unit, 10 had 0.6 unit, 9 had 1.25 units, 7 had 2.5 units, 1 had 4 units, 3 had 5 units and 1 had 10 units of antitoxin per cc. About 12 per cent. of the 42 samples had 4 units and over.

The next group of sera consisted of 4 samples obtained for other purposes and 2 from cows affected with streptococcic mastitis. One of the first 4 was very high, having 38 units of antitoxin per cc. This cow was in a herd in which there were 3 definite cases of staphylococcic mastitis and, while this cow harboured staphylococci, she did not have mastitis. Two of the other 3 animals had 5 units each and one had 2.5 units. The 2 cows infected with *Streptococcus mastitidis* had 2.5 units each.

Fourteen samples from cows with staphylococcic infections of the udder were tested. One of these had 37 units of antitoxin per cc., 3 had 20 units, 3 had 15 units, 2 had 10 units, 1 had 8 units, 1 had 4 units, 2 had 2.5 units and 1 had only 1 unit per cc. One of the cows with 2.5 units had been dry for a long time; the other, however, was a clear-cut case with gross change in the milk of one quarter. The 1-unit animal had been recorded as possibly a mild

staphylococcic infection. In the abattoir group only about 12 per cent. of the animals had 4 units and over, but in this group 11 of the 14 animals tested (79 per cent.) had 4 units and over and 64 per cent. had 10 units and over as compared with 2.4 per cent. of the abattoir group. While the number of animals is small, the difference is so great that it cannot but be regarded as significant.

#### *Examination of Whey Samples*

Thirty-two samples of whey from clean cows, and from those infected with streptococci and staphylococci, were examined by the same method. Only one quarter, in a staphylococcus-infected cow, showed high antitoxin, having 20 units per cc., which was the same as the blood titre of this animal. The milk of this quarter did not coagulate with rennet, turned bromthymol blue to a dark green, had a heavy yellow sediment and microscopically showed many degenerated polymorphonuclear leucocytes. On culture there were only a few colonies of staphylococci, whereas the other two infected quarters gave a fairly heavy growth. The other quarters of this udder had from 1.25 to 2.5 units per cc. Another staphylococcic mastitis cow with 20 units per cc. in the blood serum had 5 units of antitoxin in one quarter and from 1.25 to 2.5 in the others. All the other samples ranged from 1.25 to 2.5 units per cc.

#### *Injection of Cows with Toxoid*

With the collaboration of Dr. J. S. Kitching and Dr. H. M. LeGard, 3 cows with definite staphylococcic infections of the udder were given a series of weekly injections of toxoid prepared from a strain of human origin, and blood was collected for the determination of antitoxin content. These animals were in the same herd and all were clean when first examined, but during the year one or more quarters of each became infected with a small colony type of *Staphylococcus aureus*. Milk from these animals has been examined 14 times, with occasional negative results, but otherwise with recovery of this strain of staphylococcus. Two of these animals gave an antigenic response to the injections while the other did not. It is hard to evaluate the specific effect of the toxoid in these cases because of the natural fluctuations which are observed in the milk of infected cows, especially in the milder forms of mastitis, but the specific staphylococcus was still present in two of these cows that were examined 2½ months after the last injection.

#### SUMMARY

Nineteen cases (7.3 per cent.) of mastitis in which staphylococci appeared to be the aetiological factor were detected during the examination of 260 cows.

One hundred and ninety of 275 strains of *Staphylococcus pyogenes* fermented mannitol and 85 were negative. Twenty-four positive (12.5 per cent.) and 60 per cent. of the negative strains were recovered from apparently normal udders.

Forty of 65 strains of staphylococci showed some degree of zone production on Stone's beef extract-gelatin-agar plates and 11 of these liquefied Stone's beef extract-gelatin. Seventeen kittens were given intraperitoneal injections of 3 cc. of boiled filtrates of some of these strains and 7 of them showed some

gastro-intestinal symptoms, in one case severe. Two, however, had worms in their vomitus and should probably be excluded. All the kittens injected with filtrates showed lassitude. Two of the kittens that vomited had received filtrates of strains that were negative by both gelatin tests. (These were not the 2 that had worms in the vomitus.) One of the 4 kittens injected with unseeded, boiled medium manifested some pain and uneasiness for about 5 minutes but no lassitude. The other 3 showed no symptoms.

Agglutination and complement-fixation tests on blood serum and whey from streptococcic and staphylococcic cases were negative.

Sixty-two samples of blood serum were examined for their content of staphylococcus antitoxin in terms of International Standard Units. In a group of 42 abattoir samples from heifers and young steers, only about 12 per cent. had 4 units and over per cc. In a group of 14 staphylococcic mastitis cases 79 per cent. had 4 units and over, and 64 per cent. had 10 units and over as compared with 2.4 per cent of the abattoir group. Two cases of *Streptococcus mastitidis* infection had 2.5 units per cc. each.

One cow was found from which staphylococci were isolated but which did not have mastitis at the time of examination. The blood serum had a titre of 38 units per cc. This cow was from a herd in which there were 3 definite cases of staphylococcic mastitis. In the examination of 32 samples of whey for the presence of antitoxin, the milk of one cow showed the same titre of antitoxin as was present in the serum, namely 20 units per cc., from one quarter of the udder. The content of antitoxin in the milk of the other 3 quarters was low. In a second cow with a serum titre of 20 units the whey had 5 units per cc. in one quarter and from 1.5 to 2.5 in the others. Samples from other cows suffering from mastitis were in the last-named range.

#### ACKNOWLEDGMENTS

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## A RURAL HEALTH CONSERVATION CONTEST FOR CANADA

THE announcement in this issue of the provision of an annual rural health conservation contest for Canada will be received with great interest by health officers, particularly those concerned with rural health administration.

As is well known, the purpose of the contest is to promote the development of sound rural public health services. The need for strengthening rural health services is well known. The form of administration which permits of reasonable health services is that provided by the full-time health unit. Scattered across Canada we find such full-time county or district health units but only a small part of the rural population of the Dominion is provided with such organizations. Excellent progress has been made in the Province of Quebec where more than 60 per cent. of the population is served by such full-time local health units, and in New Brunswick the entire province has been organized in districts. In British Columbia also considerable progress has been made. In the remaining provinces, however, few full-time rural health services have been provided. Unfortunately, many of the units which do exist have only a minimum staff. Lack of financial support is the usual explanation for failure to develop beyond this point. In many rural areas there is a lack of understanding of the need and value of adequate public health services. The value of rural health conservation contests in focusing the attention of communities on their health services and thereby obtaining greater interest and more adequate appropriations has been demonstrated by the experience of the units which have entered the contest in the United States.

The Canadian Public Health Association is indeed fortunate in having the privilege of co-operating with the American Public Health Association in the conduct of the proposed contests. The American Public Health Association has most generously offered the assistance of its full-time field staff and the benefit of their experience in grading. Without such co-operation and assistance the Canadian Public Health Association could not at this time have undertaken to conduct contests throughout Canada.



## LETTER FROM GREAT BRITAIN

GEORGE F. BUCHAN, M.D., F.R.C.P., D.P.H.

*London*

THE health of England and Wales may be gauged annually from the Report of the Chief Medical Officer of the Ministry of Health "On the State of the Public Health" and the Report of the Chief Medical Officer of the Board of Education, "The Health of the School Child". The Chief Medical Officer of these Government Departments is one and the same person, namely, Sir Arthur MacNalty, K.C.B., M.D., F.R.C.P. Both of these reports for 1935 should be in the hands of all men engaged in public health practice as well as legislators and administrators. They contain a record of medical progress and in addition indicate the special features of the health work in England and Wales throughout the year. It is impossible in a brief letter to touch on all the matters that these reports contain but I propose to deal with a few of their salient features.

### ON THE STATE OF THE PUBLIC HEALTH, 1935

#### *Vital Statistics*

The population of England and Wales is now a little over 40 millions and the natural increase in population during the year was 121,355, a rise of only 500 when compared with the increase of 1934. Our national birth rate was 14.7 but as compensation for this low figure, the infant mortality fell from 59 to 57, the lowest ever recorded and less than half the rate of 30 years ago.

Changes in the age-distribution of the population commenced last century when gradually the death rate fell and expectancy of life increased. To-day the important factor is the falling birth rate which is responsible for the decrease in numbers in the younger age-groups. In 1901 every 1,000 of the population included 520

below the age of 25 years and 47 above the age of 65 years. In 1935 there were only 388 persons below 25 years of age and 81 persons older than 65 years per 1,000 of the population. The report foreshadows alterations in social service provision on account of the aging population but fails, possibly, to indicate the gravity of the trend which must eventually affect adversely the general standard of living.

#### *Experimental Epidemiology*

Reference is made to the herd experiments in the epidemiology of mice initiated over 17 years ago in an attempt to isolate particular factors contributory to the spread of disease in such a way that their respective weights might be ascertained. Direct experiments of such a nature on human beings is impossible but many conclusions have been drawn which illuminate by the use of analogy the biology of the human herd.

In one experiment a well-fed community of mice infected with an endemic disease receives immigrants in various numbers, all of whom have had no previous experience of this disease. Under these conditions the disease will never die out and the rigid quarantine of the entrants is without effect in attempting to bring any established disease to an end.

The next point is: how far is the survival of the group at the expense of susceptible entrants? One might expect the immigrants to run the gauntlet of intense infection and either die or survive the rigours of the environment. This, however, is not so and the grim conclusion is that survival in the early days confers no absolute immunity on the survivors and a large majority of herd members eventually succumb to the reigning infection.

Results obtained by immunising mice against a virus disease were, however, very different but whether a herd recruited wholly from immunised animals might be freed from such disease is a question not yet answered. The utter impossibility of controlling such a disease as influenza by general hygienic measures emphasises the importance of knowing if these diseases could be eradicated by mass immunisation.

Progress has been made in the serology of streptococci in the Ministry laboratory but lest it should be thought that all epidemiology is an academic laboratory study we would like to refer to the investigations made by a country practitioner. Dr. W. N. Pickles has investigated the epidemiology of his district with painstaking thoroughness, tracing the source of infection in almost all cases and as an outcome of the study he adduces that incubation periods are constant within very narrow limits, and he affords information on the probable mode of transmission of disease in many instances.

#### *Maternity and Child Welfare*

On account of the falling birth rate and small increment of increase in the population, closer attention is being directed to the welfare of the parturient woman and to the child. The anomaly remains that whilst the infant death rate has been halved, the death rate of women in childbirth has remained almost unaltered. It is hoped that placing midwives under the direct control and supervision of the local authorities by the Midwives Act, 1936, will exalt their professional status and will attract into midwifery work many suitable women who otherwise would seek to avoid it.

The total puerperal mortality varies in different areas from about one to over ten per 1,000 births and it would seem that improvement is possible, at least in the less fortunate districts. The summary of confidential reports on maternal deaths revealed that in nearly 50 per cent. there was no in-

evitable cause and that an improvement in the scope of the services provided, together with education of the public as to the importance of those services, offers hope of a better result.

Ante-natal services are being increased and 48 per cent. of mothers received such attention at clinics whilst many thousands more were subjected to examination by general practitioners under arrangements with local authorities. More maternity beds are being provided; the services of consultants are being made more readily available; supplementary feeding in pregnancy is receiving attention and help in the home during confinement is more frequently offered.

#### *The Insurance Medical Service*

The National Health Insurance Scheme continues whereby the State, the employers and the employed workers contribute jointly to a fund which provides medical advice and treatment for the workers by doctors of their own choice. The contracting physician receives an annual fee for each patient on his panel whether the patient is in sickness or health and this should encourage him to indulge in preventive work amongst his patients. The free and unimpeded access of 16 million persons to medical advice provides a unique opportunity for the early detection and cure of disease and is a preventive measure the value of which is difficult to assess.

Over 50 million medical attendances are given annually and in 1935 in only 157 cases was it necessary to investigate a complaint regarding the adequacy of the service. "The vast majority of Insurance Practitioners interpret the terms of their contract in no niggardly spirit and undoubtedly the standard of the service they give is not only high but yearly is rising as fresh advances of medical science add to the general practitioners' armamentarium in diagnosis and treatment".

Grants to the extent of £7,350 were

made to maintain the efficiency of the service in certain isolated or sparsely populated areas where conditions of practice make it difficult or even impossible for a doctor to earn a living. The objects served by these grants include arrangements for transport or the transmission of messages and for the provision of branch premises.

The medical referees concerned with the execution of the service paid 14,000 supervisory visits to practitioners and were called into consultation on 478,000 occasions to give a second clinical opinion.

### *Cancer*

The increase in the crude death rate from cancer continues but is explicable on the grounds of more accurate diagnosis and increased longevity of the population. In 1935 there were 64,507 deaths ascribed to this cause, giving a crude rate of 1,587 per million. The standardised death rate has remained more or less constantly in the region of 1,000 per million for ten years and has engendered the conviction that our best scientific and administrative resources must be exercised if malignant disease is to be eradicated.

The use of radiology has facilitated early discovery of the condition and the physician now adopts standards which allow a tentative diagnosis to be made sufficiently early to make treatment of some avail. The attempts to establish a serum test on which reliance can be placed have not, however, met with any success.

The use of radio-active emanations has extended treatment to cases which otherwise would have received palliative measures only, but irradiation is not to be looked on solely as a substitute for operation; it plays an important part as an adjunct either preceding or following surgical procedure. The knowledge that an operation does not inevitably follow a diagnosis of cancer will encourage patients to seek early advice should they suspect the disease.

Systematic appraisal of the results of treatment, though laborious, exacting and expensive, has extended our knowledge of the natural history of the disease and it is hoped will soon direct our efforts in prevention. Much has been done to alleviate environmental risks to those exposed to carcinogenic oils or operating radio-therapeutic appliances but continuous educational propaganda is necessary, backed up by periodic physical examination.

On the assumption that ignorance and fear are two potent reasons for causing delay in treatment, measures have been taken to mitigate these factors but the community as a whole is hesitant to seek medical advice for troubles which appear to be of a minor character. Some unrevealed factor has operated up to the present to impede the success of clinics established for the discovery of early cancerous lesions and investigations continue with the object of discovering the reason.

### *Food Poisoning*

Food poisoning, although rare in England, has been noted in 137 outbreaks, usually single cases, and has been seen in all its three types. Half the outbreaks were due to *Salmonella* infection and one small outbreak was attributed to botulism, the first since 1922.

In the majority the clinical symptoms were acute followed by rapid recovery, suggesting a bacterial toxin whilst the most frequently implicated foods were tinned or potted fish or meats. One instance was noted of food poisoning due to staphylococcal infection of farinaceous cream in which 34 people were affected.

Prior to the occurrence of three cases during the year no authenticated case of botulism had occurred in Great Britain for 13 years; consequently the outbreak is reported in minute detail. The incriminated food was a vegetable brawn which apparently had been insufficiently sterilised during preparation and spores of the

*C. botulinum* remained to proliferate in the airtight neutral medium of the brawn which unfortunately was stored at a high temperature. As a consequence of this accident, firms engaged in canning are advised to seek information, especially in America, and instal appliances which will ensure efficient sterilisation. The growing practice of home canning of vegetables is discouraged.

#### THE HEALTH OF THE SCHOOL CHILD, 1935

##### *Nutrition and the School Child*

The year 1935 was eventful in the study of the nutrition of school children in that it saw the formation of the Advisory Committee on Nutrition and the initiation or extension of the movements for the provision of extra nourishment which now constitute the largest experiments in supplementary feeding the world has yet seen.

Classification of nutritional condition on a clinical basis has been standardised in all areas by the institution of four categories—excellent, normal, slightly subnormal and bad. This clinical classification is open to adverse criticism on the grounds that it is an unscientific aesthetic opinion at the best which is recorded, or at the worst a pure guess; yet in the present state of knowledge no more accurate assessment is possible.

One and a half million children were classified on the new basis and of these 10.6 per cent. were slightly subnormal and in 0.7 per cent. of cases the nutrition was bad. This does not mean that 11.3 per cent. of those examined failed to get an adequate supply of food, as food is the instrument, nutrition the act of using it. Inadequate sleep, lack of sun or fresh air, unsatisfactory housing, all have a bearing and the recently instituted nutrition clinics are investigating the problem.

Analysis of the nutritional condition in various areas, whilst demonstrating the generally satisfactory standard, does, however, show that in

certain of the "special areas" where industrial depression has been marked a few of the children "bear on their bodies the marks of the economic hardship of recent years".

There is a wealth of testimony to show the benefit accruing from the provision of milk in schools and the fact that 45.8 per cent. of all children attending take one-third of a pint of milk each day is evidence of appreciation on the part of children and parents. Free meals are provided in many urban areas for necessitous children and generally speaking dietaries are sound, whilst in rural districts the school canteens afford a means whereby children living a distance from school are assured of an adequate and well cooked lunch.

"The fear of underfeeding its children is haunting the conscience of the nation" but apart from those areas where long-continued depression has left its stain the nutrition of our children is adequate and constantly improving.

##### *Medical Inspection*

The routine medical inspection of all children attending the state elementary schools in this country at the ages of five, eight and twelve years, has remained substantially the same since its inception in 1908, but now healthy discussion is commencing concerning the possibility of modifying the system to augment its efficacy.

On the one hand it is suggested that the intervals are too long between inspections and as a remedy more frequent routine medical inspections are desirable. Upholders of this ideal maintain that any other method of ascertainment of defects would fail and many of those children most in need of examination or treatment would be overlooked. At the other extreme it is suggested that only the routine inspection of entrants (5-year-olds) is required and ascertainment of defects later should be by other means. Protagonists of abolition suggest that routine examinations degenerate into a mere cataloguing of

defects and it has to be admitted that this is a danger against which one must be constantly on guard. There is universal agreement that the routine medical inspection of entrants must continue and the consensus is that inspection of leavers should also be undertaken.

The new methods by which it is suggested defects can be found during school life appear attractive and comprehensive, yet one hesitates to introduce a new untried system for one which has proved itself in the past to be efficient in bringing to light physical defects in the children.

#### *The Nursery School Movement*

The nursery school movement, providing education for children below the age of 5 years, continues to grow in extent and efficiency.

During the year many new schools have been built by education authorities and others by voluntary bodies with the assistance of grants. About 6,000 children received this advantage of close medical supervision between the ages of 2-5 years whilst in their daily routine they enjoyed a correct balance of free activity, rest and sleep. Unhampered, yet directed towards the acquisition of sound habits and morals, the syllabus is influencing the child mind at its period of greatest receptivity and pliability, with, it is hoped, consequent benefit in later life.

The desirable effect of increasing parental responsibility and interest in child education is abundantly proved and methods adopted by nursery school staffs are being advantageously applied more widely in infants' departments throughout the country.

The Board of Education is urging all authorities to survey the needs of their areas and is encouraging the provision of nursery schools, particularly in new estates where slum dwellers are being re-housed. The need is greatest in districts where social conditions are unduly poor, where there is much employment of married women or where danger might be anticipated from busy arterial roads.

#### *Acute Rheumatism*

The recrudescence of mortality from acute rheumatism seems now to have abated and in 1935 the crude death rate is down to 29 per million. Such temporary set-backs are recognised incidents in the curve of descending mortality and must be expected to occur again in the future. It may be that our efforts are stimulated thereby to combat the malady.

The gravity of rheumatic fever does not depend on the severe pain or the arthritis which are rapidly alleviated but upon the frequently associated heart disease, and as the second half of school life is the period of greatest incidence it is appropriate that the local education authorities should be concerned with prevention and treatment of disability from rheumatic heart disease.

The ascertainment of early cases is best secured by an alert school medical service and co-operation with practitioners and voluntary agencies; compulsory notification seems to add little. Accurate diagnosis is secured by the institution of rheumatic clinics where patients have the advantage of examination by experts assisted by electrical diagnostic apparatus. Those requiring treatment receive it, whilst those not in need of supervision are quickly discharged.

Residential schools for rheumatism must be available for the immediate admission of cases and should be so constructed that floor space available per case is at least 70-80 square feet with cross-ventilation to avoid as far as possible any recurrence of streptococcal sore throat. The South of England is well provided but more schools are necessary in the Midlands and North, where, at present, rheumatic children are occasionally sent to open-air schools for which they are unsuited.

Follow-up work for the permanently handicapped is of supreme importance to direct their choice of suitable school or employment and well repays any expenditure of time or effort.



## RURAL HEALTH CONSERVATION CONTEST

COMMENCING this year, an annual public health conservation contest for Canada will be open to rural areas with a full-time health service. The object of the contest is to promote the development of sound rural public health services. It will be conducted by the Canadian Public Health Association in co-operation with the American Public Health Association, along the lines which have been so successful in the United States, where such contests have been a valuable means of securing more adequate public health services in rural areas by enlisting public interest in the local situation. The project for both countries is made possible by a grant of the American Public Health Association from the W. K. Kellogg Foundation.

All full-time units participating in the contest appraise their health activities by preparing a fact-finding schedule which covers minimum basic essential rural public health services. In compiling the fact-finding schedule, it is essential to use the services of a local lay committee because it is in this way that the people learn about the situation of their own area and become interested in public health developments. The importance of making the most effective use of such a group cannot be overemphasized. The appointment of the local lay committee is one of the requisites in entering the contest. It should have representatives of business and industry or agriculture as well as professional representation. It should co-operate with the local health, education, and civic agencies in the effort to bring about definite improvements in health conditions. With but few exceptions the questions in the fact-finding schedule have been taken from the Appraisal Form for Rural Health, third edition, published by the American Public Health Association in 1932. The schedule permits of a reasonably sound judgment of the community public health program. These sche-

dules are passed upon by a Grading Committee and a detailed analysis of each schedule is forwarded to the unit which submitted it.

Although the competitive aspect of the contest tends to stimulate and sustain interest, it is designed primarily to encourage the development of sound rural public health work. Field service, supplied by the full-time staff of the American Public Health Association, will make contacts with the units in the furtherance of this objective. These inspection visits by representatives of the Grading Committee are of great assistance to the administrative officer in charge of the local units and to the members of his staff, giving the opportunity for discussion of local problems in the light of current practices. Canada will be considered as one division and the awards will be made on that basis. The winning unit will be awarded a suitable plaque, and certificates of honourable mention will be presented where the Grading Committee considers that these have been earned.

To permit of ample time for the organization of the work, it is planned to hold the first contest in the spring of 1938. Opportunity will be given at the annual meeting of the Canadian Public Health Association, which will be held in Ottawa June 17th to 19th, to discuss the subject. It is hoped that Dr. Carl E. Buck will be able to be present to confer with those who are specifically interested and to give to the Association an outline of the plan. The chairman of the Committee on Rural Health Conservation Contests in Canada is Dr. Grant Fleming and Dr. J. T. Phair will act as Secretary.

Further information will be sent shortly to the full-time rural health officers concerning the details of the contest. In the meantime, questions are invited and may be addressed to the Secretary of the Canadian Public Health Association, 105 Bond Street, Toronto.



# THE ANNUAL MEETING

CHATEAU LAURIER, OTTAWA, JUNE 17-19

MANY health officers are planning to make the annual meeting an occasion for a real visit to the city of Ottawa, taking full advantage of the invitations to visit the many departments of government and institutions which are of special interest. To assist such members and to make it possible for those who are forced to limit their stay to the three days of the meeting to choose the visits which are of greatest interest to them, a series of short articles on the various departments of government engaged in public health work will be presented. The Association is indebted to the members of the Local Committee on Arrangements for the preparation of these contributions. In the March issue an outline of the many attractions of the city was presented. In this issue, through the kindness of the Honourable Major Power, Minister of Pensions and National Health, the chief activities of

the National Health Section of the Federal Government are outlined. Of special interest to those interested in laboratory work are the Laboratory of Hygiene, the laboratories of the National Research Council and of the Food and Drugs Division of the Federal Department, and the Animal Diseases Research Institute. On page 203 of this issue, Dr. E. A. Watson, Chief Pathologist, describes the facilities and work of the Institute, which it is hoped many will be able to visit.

Many health officers will desire to visit the Dominion Bureau of Statistics. Dr. R. H. Coats, Dominion Statistician, has kindly contributed an outline of the work of the Bureau (page 204) which will make such a visit of greater value.

The Local Committee on Arrangements desires to urge those planning to attend the meeting to make hotel reservations at an early date.

HOTEL ACCOMMODATION IN OTTAWA AND HULL

Hotel	Number of rooms	Rooms with bath	Rooms with running water	Single room with bath	Double room with bath	Single room with running water	Double room with running water
Chateau Laurier.	525	400	125	\$4.00-\$5.00	\$6.00-\$7.00	\$3.00	\$4.50
Alexandra . . . . .	105	64	41	\$2.50	\$4.50	\$2.00	\$3.50
Windsor, Metcalfe St. . . . .	85	25	60	\$2.50	\$4.00	\$2.00	\$3.00
Y.M.C.A., 127 Metcalfe. . . . .	110*		15-20			\$1.25-\$1.50	\$2.00
Bytown Inn . . . . .	38	0 (1 bath every 2 rooms)	38			\$1.50-\$2.00	\$3.00-\$4.00
Standish Hall, Hull . . . . .	25	10	15	\$3.00	\$4.00	\$2.50	\$3.00
Chez Henri, Hull	32	19	13	\$3.00	\$4.00	\$2.00	\$3.00

\*15-20 rooms available.

NATIONAL HEALTH SECTION, DEPARTMENT OF PENSIONS  
AND NATIONAL HEALTH

**T**HE Federal Department of Health was established in the year 1919 and was merged with the Department of Soldiers' Civil Re-Establishment in the year 1928, to form what is now the Department of Pensions and National Health. The National Health Sec-

comprise Quarantine, Immigration, Marine Hospitals, Food and Drugs, Opium and Narcotic Drugs, Sanitary Engineering, and a Division for the Examination of Civil Servants in respect of sick leave and superannuation.

With the object of bringing Provincial Health Officers together to discuss common public health problems, the Dominion Council of Health was established. This comprises the Chief Officer of Health of each of the provinces and certain lay members representing industry, agriculture, rural and urban women's organizations and an experienced public health adviser. The Deputy Minister of the Department of Pensions and National Health acts as chairman.



**DR. R. E. WODEHOUSE, O.B.E., D.P.H.**  
Deputy Minister of Pensions and  
National Health

tion of the Department is not a department of health in the generally accepted sense of the term, but comprises a number of public health services which are national in character.

The British North America Act gives jurisdiction over quarantine and marine hospitals to the Dominion; and over general hospitals, asylums, and eleemosynary institutions to the provinces. As public health developed, the Dominion assumed responsibility for such public health services as were exclusively Dominion or inter-provincial in aspect, and the provinces for such as were exclusively provincial in character.

The Divisions of the National Health Section of the Department

The oldest health service in the country is that of Maritime Quarantine, for which the Dominion assumed responsibility at the time of Confederation. This Division is responsible for the prevention of the entrance into the country of quarantinable diseases: namely, cholera, plague, yellow fever, typhus and smallpox. Each vessel from abroad which enters a maritime port of Canada is obliged to undergo quarantine inspection. One of the important functions of the Quarantine Division is the fumigation of ships for the purpose of deratization. All ships arriving at ports of Canada, except coasting vessels, are subject to periodical fumigation for the destruction of rats. Following such fumigation a Deratization Certificate is issued. When, upon inspection, a ship is found to be permanently so maintained as to keep the rat population down to a minimum, fumigation may be waived and a Deratization Exemption Certificate issued. Vessels from plague-infected ports are given special attention to insure protection for our ports against the entry of plague-infected rats. All such vessels are rat-guarded until after final inspection or fumigation. If empty they are carefully inspected and, if necessary, fumigated.

If en route, the vessel and cargo are inspected while unloading and if found infested, immediate fumigation is carried out.

For the purpose of examining immigrants prior to their entrance into Canada, departmental physicians are maintained in London, Paris, Antwerp, and Hamburg. These officers conduct medical examination of immigrants and act as advisers to the Department of Immigration. They examine prospective immigrants for Canada, with the object of detecting those who are mentally or physically diseased or defective. The Immigration Act of Canada prohibits the entrance of mental defectives and the insane; those suffering from loathsome and dangerous contagious diseases and those suffering from physical defects which may incapacitate them in the general labour market and make them a burden upon the public. It also prohibits the entrance of persons of constitutional psychopathic inferiority; chronic alcoholics, etc. In addition to the examination that takes place before embarkation at the port of departure, immigrants are subject to inspection at the port of arrival. In this way, a double check is maintained upon them. Since the medical examinations have been conducted in Great Britain and Europe many thousands of prospective immigrants, who were found to be defective, have been prevented from entering the country.

The Marine Hospital Division has to do with the medical care and treatment of sick mariners. For this purpose, sick mariners' dues are collected from each vessel entering a maritime port in Canada. These dues provide treatment for sick mariners who fall ill while their vessel is in port. For the purpose of treatment, the Department has a contract with general hospitals in the chief maritime ports, and at smaller ports physicians are maintained on a salary or fee basis. The average number of sick mariners treated during any calendar year is, roughly, 7,000.

One of the more important of the

Divisions of the Health Section is that of Food and Drugs. A Food and Drugs Division was established in the year 1884 under the Department of Inland Revenue. This was transferred to the Department of Trade and Commerce in 1915, and in 1919, to the Department of Health. Under the Food and Drugs Act, standards of food and drugs are set up. Details of these standards are to be found in the Regulations under the Food and Drugs Act. To see that these standards are adhered to, twenty-six food and drug inspectors are stationed at strategic points throughout the country; and for the purpose of analysis, six Food and Drug Laboratories are maintained, namely, at Vancouver, Winnipeg, Toronto, Ottawa, Montreal, and Halifax. During the first year that this branch was administered by the Department of Health, the number of samples of food and drugs analyzed was 4,906, and during the last fiscal year the number was 17,939. The first report on food and drugs was made some sixty years ago. This report, in referring to dishonesty in traders, pointed out that no fewer than fifty-one per cent. of the samples examined were adulterated. At the present time, the percentage of samples of food and drugs showing adulteration is very much less. Particular attention is paid to the inspection of imports to prevent the entrance of adulterated and misbranded products. Under the Food and Drugs Division, there is also maintained a Laboratory of Hygiene, which is divided into two branches—one devoted to bacteriological examinations, and the control of the production and distribution of vaccines and sera, etc., and the other to the supervision of pharmacological preparations, such as digitalis, ergot, and salvarsan, which are commonly defined as potent drugs. In addition, there has recently been established a Nutrition Laboratory.

The activities of the Proprietary or Patent Medicine Division consist chiefly of raising the standard of secret formulae of medicinal prepara-

tions and eliminating false, exaggerated and misleading claims for these preparations. They are supervised by the food and drug inspectors and subject to analysis in the Food and Drug Laboratories.

One of the more difficult public health problems is the control of the importation, manufacture and sale of narcotics. The Opium and Narcotic

traffic in narcotics is controlled by the Royal Canadian Mounted Police.

The Sanitary Engineering Division supervises water supplies on vessels plying between Canada and the United States and on trains throughout Canada and, in addition, conducts sanitary surveys of oyster-producing areas. It also is responsible for the sanitary arrangements of the Na-



AERIAL VIEW OF OTTAWA

Showing the Chateau Laurier, the Parliament Buildings and the North Shore of the Ottawa River (R.C.A.F. photo).

Drug Division, operating under the Opium and Narcotic Drug Act, requires that wholesale and manufacturing druggists shall be licensed for the purpose of dealing in narcotics. A special licence is required for the importation of narcotics and also for their export. Strict supervision of narcotics is maintained from the time they enter the premises of the wholesale or manufacturing druggist until they reach their final destination. All sales to retail druggists and doctors are checked. Doctors' prescriptions, which are retained by druggists, are also subject to scrutiny. The illicit

tional Parks of Canada; and administers the Regulations under the Public Works Health Act which has, as its object, the preservation of the health and mitigation of disease among persons employed in the construction of public works, such as railways and canals.

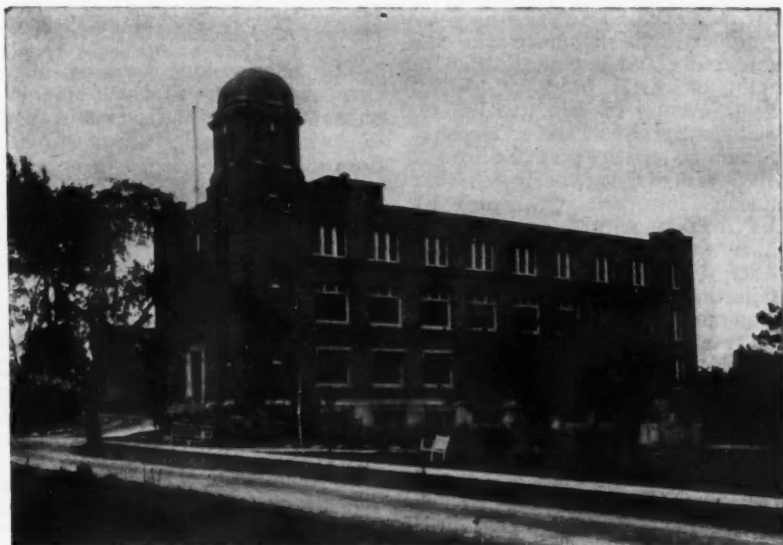
The Medical Examination Branch supervises sick leave of civil servants and collects statistics regarding the various illnesses. It is also responsible for the medical examination of civil servants for the purposes of superannuation.—J. J. Heagerty, M.D., C.M., D.P.H.

## THE ANIMAL DISEASES RESEARCH INSTITUTE, HEALTH OF ANIMALS BRANCH

**T**HE Animal Diseases Research Institute is located in one of the suburbs of Hull City, on the Quebec side of the Ottawa River, opposite the City of Ottawa. It was erected in the year 1927, for the purpose of establishing a Canadian centre for research in comparative pathology and to pro-

the exception of horses, are bred and raised on the premises under laboratory supervision, thus eliminating many otherwise unknown factors in respect to heredity, nutrition and environment, and intercurrent or spontaneous disease.

The Institute is composed of three



ANIMAL DISEASES RESEARCH INSTITUTE

vide better accommodation and facilities for the Biological Laboratory, Health of Animals Branch. The Institute contains well-equipped laboratories, a library and a museum. The laboratories are arranged in pairs, between which are double incubator and refrigeration rooms, one section of each serving the laboratory on the connecting side. This is a rather unique arrangement which makes for convenience, conservation of space, and economy in operation. The out-buildings include horse stables and cattle barns, sheep, fox and dog compounds, poultry houses and small animal breeding houses, and separate buildings for the study of virus diseases. All experimental animals, with

main divisions, namely, research, biological products, and diagnostic and general laboratory services.

The major studies undertaken by the research division relate to tuberculosis, Bang's disease and Brucella infections, Johne's disease, mastitis, distemper and other virus diseases. A long extended study of vaccination (BCG) against tuberculosis and continuous trials over a ten-year period have recently been brought to conclusion. The Institute is contributing to a knowledge of the nature and properties of tuberculin and other biological reagents, their development and preparation in synthetic culture media, ultrafiltration, and standardization. Strains and types of acid-fast

bacilli found in so-called skin lesions of cattle and in other atypical and questionable forms of tuberculosis are studied and an attempt made to classify them.

Studies relating to *Brucella* infections fall into the following groups: (a) strains, types and biology; (b) pathogenicity and host susceptibility; (c) infection, immunity, and the 'carrier problem'; (d) problems in diagnosis; and (e) vaccination and prophylactic methods.

Another division undertakes the manufacture and standardization of certain biological products, principally tuberculin, mallein, and Johnin. Specific antigens and the corresponding immune sera are prepared for use in the serum diagnosis of *Brucella* and *Salmonella* infections. Other preparations include anti-distemper, anti-mallein and anti-brucellin sera.

Allergy, in its varied forms and manifestations, its relationship to infection and immunity, and the conditions favouring or inhibiting allergic phenomena, presents problems of special interest to the laboratory workers.

The diagnostic division occupies itself with routine diagnostic and general laboratory services, including the examination of pathological specimens, blood, milk and water samples, faeces, animal parasites, and meat and canned food products.

The Pathological Museum contains a collection of tuberculous processes as evolved in different animal species, of pathological conditions found in food-producing animals, and specimens of rare diseases.

The relationships between infections and diseases to which man and animals are liable, the sources of those diseases and their transmissibility from one animal species to another, and from animal to man, must be considered as of no less importance from a public health viewpoint than from that of animal industries. In animal and human health problems there are interminable points of contact, and in all the same fundamental guiding principles hold fast.—*E. A. Watson, V.S., Chief Pathologist.*

### THE DOMINION BUREAU OF STATISTICS

THE records of births, deaths and marriages amongst the French Roman Catholic population of Lower Canada are available from the earliest settlement of the colony, and the first Census of modern times was taken in Canada in 1666. During the 19th century, Censuses of Upper and Lower Canada and of Nova Scotia, New Brunswick and Prince Edward Island were taken at various times, and the British North America Act of 1867, which allocated the "Census and Statistics" to the Dominion Government, provided for the taking of a decennial census.

A permanent Census and Statistics Office under the Ministry of Agriculture was established in 1905 and operated to create a general statistical point of view and to facilitate the later establishment of the Dominion Bureau of Statistics. In 1912 the Minister of Trade and Commerce recommended

the appointment of a Departmental Commission to enquire into the statistical work being carried on in the various Departments, to report on a comparative and adequate system of general statistics and to consider the possibilities of co-operation with the provinces. This Commission recommended the organization of a central statistics office for the co-ordination, unification, extension and general improvement of statistics.

The first step in carrying out this report was taken in 1915 by the creation of the office of Dominion Statistician, with the duty of devising a practical scheme for the organization of a central Canadian Statistical Office, and establishing a system of co-ordination with the various Departments of the Dominion Government and with Provincial Governments. The Dominion Bureau of Statistics was establish-



ed in 1918, to operate under the Statistics Act passed in that year.

Since the establishment of the Bureau, statistical progress has been made in many directions, for example in the creation of a unified and co-ordinated scheme of agricultural information and statistics; the organization of an annual industrial Census; consolidation of external trade statistics; the introduction of a common tripartite scheme for the classification of commodities and industries (*viz.*, by chief component material, by purpose and by origin) in production, trade, and prices statistics; the development of transportation statistics; the extension of prices statistics and the inclusion of prices of services and of securities; the planning of comparable statistics of provincial and municipal public finance, the estimation of the national wealth and income and of the international balance of payments; and the establishment of Dominion-wide educational statistics. In many of these developments, not only was co-operation established with various Departments of the Dominion Government, but also with the Provincial Governments. The extension of the Census schedules and the development of mechanical tabulation by the use of greatly improved machinery, notably of machinery invented in the Bureau, has enabled a degree of cross-classification to be made in recent Censuses, which is of the greatest value for the purpose of statistical analysis. In connection with the Census of 1931 a special Census of Institutions and a Census of Merchandising and Service Establishments were taken, both serving as a starting point for new branches of statistics, while the information obtained regarding unemployment, coupled with the monthly data which have been received from employers over a period of years, provide invaluable information in this important field. To co-ordinate information from the Census and other sources a Division of Social Statistics has been established.

Amongst the most important statistical achievements since the organization of the Bureau has been the establishment of a National System of Vital Statistics. Two Dominion-Provincial Conferences on Vital Statistics were held in 1918, and from the beginning of the year 1920, eight provinces co-operated with the Bureau for the production of National Vital Statistics. Although the Province of Quebec found it impossible to enter into the National System at the time it was established, the difficulties present were overcome in later years, and this province entered from the beginning of 1926. The system entails compulsory registration and the use of standard forms containing the same essential details. In matters relating to statistics of causes of death, the Dominion Bureau of Statistics maintains a close relationship with the Department of Pensions and National Health.

Since the Canadian Public Health Association established a Section of Vital Statistics (now the Section of Vital Statistics and Epidemiology) in the year 1930, the Bureau and the Registration Departments of the Provinces have kept in close touch with this Section, and the recommendations of various Committees of the Section, on which Dominion, Provincial and Municipal offices have had representation, have been received and in large measure officially adopted. These recommendations have covered such subjects as the definition of stillbirth, classification according to residence, the insertion of "nationality" on birth and death certificates, and the certification and statistics of causes of death. The Section has assisted in the drafting of a new Death Certificate placed in the field during 1935, in the preparation of a "Handbook of Death Registration and Certification" (successor to the "Physicians' Pocket Reference") and in the framing of recommendations for the next revision of the International List.—*R. H. Coats, B.A., LL.D., Dominion Statistician.*

## BOOKS AND REPORTS

**Introduction to Human Parasitology.** *Fifth Edition.* Asa C. Chandler, M.S., Ph.D., Professor of Biology, Rice Institute, Houston, Texas. 661 pages. John Wiley and Sons, Inc., New York, 1936. \$5.00.

HUMAN parasitology, like other branches of medicine, has continued to be the subject of intensive research since 1929 when the fourth edition was published. Arising from this are many new facts and concepts that serve to lessen proportionately the customary discursiveness of texts on this subject, all of which fully justifies this fifth edition. Almost every subject has required some changes which have entailed considerable re-writing. It has been arranged and written in such a manner that even a layman may become interested in this fascinating subject.

The criticisms which appear to your reviewer from a perhaps prejudiced viewpoint are chiefly those associated with the problems of immunology as related to parasitology, that may purposely have been avoided in the text which is entitled an "Introduction". The discussion on resistance and immunity is limited to seven pages in chapter II, and is restricted to the information associated with protozoan and helminthic parasites. The exhaustive work in respect of this problem that has been devoted to yellow fever and the typhus group of fevers is worthy of fuller consideration, even in a book of this character, because it offers another method of parasite control which hitherto has not received due consideration in the unjustifiably limited field to which parasitologists have restricted themselves in the past.

This is one of the most serviceable and readable texts on the general subject of parasitology, and continues to

maintain the standards set by the previous editions.

P. A. T. Sneath

**Year Book of General Medicine.** Dick, Brown, Minot, Stroud and Eusterman. *The Year Book Publishers, Inc., 304 South Dearborn Street, Chicago, 1936. 848 pages. \$3.00 postpaid.*

THE "Year Book of General Medicine" is one of ten practical volumes of a series which is now in its 36th year. This fact is testimony to the value of these publications to the medical profession. The tremendous literature on all phases of medical interest which accumulate during the course of a year as a result of the extensive and innumerable scientific researches which are being undertaken makes such a series of year books as this of inestimable value to physicians who desire to keep in touch with newer progress in current problems.

To those who are acquainted with these books it need only be said that the 1936 edition of the "Year Book of General Medicine" is at least as well done as previous issues; to those who have not yet made use of this digest of the year's literature in this field it should be pointed out that this is without doubt the leading digest of its kind.

For those whose time is particularly limited the excellent arrangement of the material will facilitate the necessary selection of reading. It would probably be worth while for the editors and publishers to consider the use of a larger size page despite the disadvantage of altering past practice. The text covers so many pages in its present form that a change to the larger and customary book size would appear to be indicated.

A. Hardisty Sellers

**Annual Report of the Surgeon-General of the United States for the Fiscal Year 1936.** *For sale by the Superintendent of Documents, Washington, D.C. 158 pages. \$1.00 (cloth).*

THE Annual Report of the Surgeon-General of the Public Health Service for the Fiscal Year 1936 is the first under Surgeon-General Thomas Parran. The chief merit of the report is that it is so unlike the customary stereotyped official health report. It is informative and indeed instructive in its content, statistical data being included only where specifically needed.

The preface by Dr. Parran gives a digest of the report. Studies on cancer and rheumatic heart disease have proceeded further. In respect to the latter, which "ranks with tuberculosis, syphilis and cancer as a cause of disability and death", the objectives are to secure more accurate data on incidence and to collect epidemiological data. These studies are being pursued in Philadelphia. Attention is directed to the recommendation of the Public Health Service that in reporting cases of poliomyelitis, "distinction be made between frank paralytic cases and non-paralytic or abortive cases, and that comparison of incidence be based on the number of frank cases." The existence of several conditions likely to be confused with non-paralytic cases has been emphasized and lends weight to this recommendation.

A surprising statement is found in the Surgeon-General's remarks, namely, that "syphilis ranks with cancer, tuberculosis and pneumonia as a leading cause of death". If it is true, mortality statistics must be regarded as entirely useless because they provide no support for such a statement. In so far as Canada is concerned the statement is certainly not true.

Various aspects of the national health program instituted under the public health program of the Social Security Act are reviewed. These are of great interest to Canadian workers. The outline, too, of the co-operative activities with other federal and with state departments gives a clear picture of this important aspect of the Service.

Investigation of disease and co-operation with the states in promoting public health are important factors of the Public Health Service. The number and extent of the scientific researches under the Public Health Service are tremendous. Nutrition, child health, industrial disease, milk sanitation, venereal disease, and various epidemiological studies are under way. Through a grant of three and a half million dollars from emergency relief funds, a study of health and health problems on a large scale was made possible. This investigation covers four major efforts. A chronic disease survey of 865,000 families (to date) is the first effort of its kind on a national scale, and seeks to collect data on the chronic diseases which are a major cause of unemployment, disability, and death among persons of mature age. A survey of communicable diseases covering 250,000 families is also in progress. In the field of occupational mortality and morbidity, 550,000 schedules have been transcribed for analysis from the records of 4,000 corporations. Finally, a health-facilities study including a census of hospitals, out-patient departments and public health facilities, is being undertaken. Further progress, too, has been made in connection with the data on causes of illness and kind of medical care in the 9,000 families canvassed in the study made in co-operation with the Committee on the Cost of Medical Care.

A. Hardisty Sellers

## BOOKS RECEIVED

JUVENILE PARESIS. William C. Menninger, M.D. Published by the Williams & Wilkins Company, Baltimore, Md., 1936. 199 pages. Price \$3.00.

HANDBOOK ON HEALTH EDUCATION. A guide

for teachers in rural schools, Ruth E. Grout, Director of Health Education Study, Cattaraugus County, New York. Published by Doubleday, Doran and Company, Inc., Garden City, New York, 1936. 298 pages. Price \$1.80.

## CURRENT HEALTH LITERATURE

*These abstracts are intended to direct attention to articles that have appeared in other journals during the past month. Any of the journals referred to may be borrowed for three days or longer if desired. Address requests to the secretary of the Editorial Board.*

### Sources of Infection and Seasonal Incidence of Tularaemia in Man

IN addition to enumerating the known sources of human tularaemia and discussing the seasonal incidence of the infection, this review provides information on the distribution of the disease in the U.S.A., the appearance of infected rabbits, symptoms of infection in man and preventive measures. Numerous cases following tick and insect bites have been reported, as well as infections contracted through handling rabbits, squirrels, etc.

Edward Francis, U.S. Pub. Health Rep., 1937, 52: 103.

### Experience with the Picric Acid-Alum Spray in the Prevention of Poliomyelitis in Alabama, 1936

DURING the 1936 Alabama epidemic of poliomyelitis an attempt was made to evaluate the use of a chemical prophylactic applied to the nasal mucosa. Based on the number of paralytic cases occurring in the unsprayed control group, there was an apparent reduction of some 35 per cent. among the group who received the spray. However, poliomyelitis developed in certain cases where spraying had been carried out according to instructions, suggesting either that the chemicals were not effective for man or the method of application as used in animal experiments was not suitable for man as practised.

Charles Armstrong, Am. J. Pub. Health, 1937, 27: 103.

### Effects of Very Early Serum Treatment in Pneumococcus Type I Pneumonia

IN 160 cases of Type I pneumococcal pneumonia who were given specific serum in the first 24 hours of the disease, the death rate was only

5 per cent. as compared with 33 per cent. in 565 untreated cases and 15.7 per cent. in 1,494 cases who received serum at some time in the course of their disease.

The clinical improvement in the cases responding to serum treatment was rapid and striking; the pathology in the lung was localized; the morbidity was cut short and complications such as empyema were avoided.

Serum is now available for 65 per cent. of all pneumococcal pneumonias.

R. L. Cecil, J.A.M.A., 1937, 108: 689.

### Five Hundred Cases of Scarlet Fever caused by Use of Raw Milk from Infected Cow

ACCORDING to a statement by the New York State Department of Health, a recent epidemic of 500 cases of scarlet fever has been traced to the use of raw milk from an infected cow. When the sale of raw milk from the dairy concerned was stopped, the number of cases rapidly declined. The cow had been on a farm where three cases of scarlet fever had occurred, one patient being a milker. Immediately afterwards the cow was introduced into the dairy herd and the outbreak began a few days later.

U.S. Pub. Health Rep., 1937, 52: 113.

### Occupational Cancer of the Lung

DUST inhalation generally does not appear to give rise to cancer of the lung but workers exposed to chromate dust and radium emanations show a high incidence of this disease. The disease develops only after long periods of exposure to these agents, but where this condition has been fulfilled it may appear many years after exposure has ceased. A short work-day, a short total length of service, frequent holidays and alternation of work appear to be the only effective means of control. In addition a high standard of general hygiene should be maintained.

L. Teleky, J. Indust. Hyg. & Toxic., 1937, 19: 73.

